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The JOURNAL of
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LAWS IN THE APPEARANCE AND THE DEVELOPMENT OF VOICE-HYPERFUNCTIONS

EMIL FROESCHELS, M. D.,
From the Speech Clinic of Central Institute,
St. Louis, Mo.

Certain functional disorders affecting the singing and speaking voice seem to be characterized by a contraction of the intralaryngeal muscles and some muscles of the resonating cavities which is too forcible. It is a fact that the unphysiological use of some groups of muscles unfavorably influences other groups, directly or indirectly joined with the function of the first mentioned group. Therefore an exact investigation will always show some irregularities, for instance in the function of the diaphragm and the thoracic muscles if some intralaryngeal muscles and those of the resonating cavities are working too strongly. But in this paper we shall neglect these "secondary" faults. *My purpose is to attempt localization of different abnormal tones and noises in different parts of the voice apparat.*

During the last 15 years I have been very interested in studying impediments covered under the names of functional hoarseness, of phonasthenia, rhesasthenia and klesasthenia. This effort seemed to me to offer the only possibility of making some progress in the very dark field of functional voice troubles. The first division I made was a *distinction between spastic and paretic hoarseness* which names I later substituted by the words *hyper- and hypofunction.* All these expressions imply a too high or a too little participation of muscles which produce the voice. But until today it has seemed impossible to establish the facts concerning any malfunction of the muscles by optical investigations in spite of the fact, that G. O. Russell has given us his very useful fonofaryngoskop, because the muscles are too small. (Now and then one may see a crossing of the vocal cords or even a very narrow isthmus faucium but usually the degree of hyperfunction is not so pronounced.) The diagnosis of hyper- or hypofunction is rather an acustical one. The well-trained ear of the examiner obtains an impression of unphysiological and unhygienic

working and probably some investigators thus get a synesthetic sensation in their own corresponding muscles.

My next step was the attempt to differentiate the points where the most apparent hyperfunctions take place. I found seven kinds of hyperfunctions localized on seven different spots. The tables herewith may help to demonstrate these places. Let us begin with number II which represents the level of the vocal lips. The hyperfunction appearing at this place is well known in the literature as "coup de glotte" or as "hard intonation." Number III indicates a too violent contraction of some pharyngeal constricting muscles. The observer

TABLE I

NUMBER OF DIFFERENT HYPERFUNCTIONS

	I	II	III	IV	V	VI
Adults	45	94	63	94	50	72
Children	1	127	98	3	..	2

TABLE II

COMBINATION OF BREATH PRESSURE WITH THE OTHER HYPERFUNCTIONS

	I	I II	I III	I IV	I V	I VI
Adults	11	7	6	7	4	10
Children	1	..	..	..	..	..

TABLE III

COMBINATION OF COUP DE GLOTTE WITH III, IV, V, VI HYPERFUNCTIONS

	II	II III	II IV	II V	II VI
Adults	27	17	19	6	18
Children	42	83	..	..	2

gets the impression of a slight degree of self-strangulation. Number IV means a retraction of the posterior part of the back of the tongue and of the root of the tongue. Number V symbolizes a hyperfunction of the soft palate similar (but not so constant) to the cramplike elevation of the soft gum in a case of rhinolalia clausa functionalis (which I prefer to call the hyporhinolalia functionalis). Number VI means a stiffening of the blade and of the tip of the tongue and Number VII a stiffening of the lips. Safe to say that all these hyperfunctions are only present whilst singing or speaking. The reason why I mention Number I last, is that this hyperfunction is not a local sign for false working muscles. The investigator sometimes gets the impression that the air is pushed violently from below against the vocal cords.

Until now I could not find a way to localize different kinds of hypofunctions because in all these cases I got only the unclear impression of a defective function in the closure of the glottis.

My experiences with this localizing method covers over 1000 cases. I want to give account of 488 of them, 317 adults and 171 children under 16 years. The adults are trained singers or speakers.

From the first table we see how often the different hyperfunctions appeared. It is striking that number I appears only once in children but 45 times in adults. Regarding the circumstance that many of the adults were professionally occupied phoneticians the

TABLE IV

COMBINATION OF PHARYNGEAL CONSTRICTIONS WITH IV, V, VI HYPERFUNCTIONS

	III	III IV	III V	III VI
Adults	27	2	2	9
Children	15	..	..	..

TABLE V

COMBINATION OF POSTERIOR TONGUE RETRACTION WITH V, VI HYPERFUNCTIONS

	IV	IV V	IV VI
Adults	39	9	18
Children	3	..	..

TABLE VI

COMBINATION OF SOFT PALATE HYPERFUNCTION WITH VI HYPERFUNCTION

	V	V VI
Adults	22	7
Children	..	..

TABLE VII

STIFFENING OF LIPS WITHOUT OTHER HYPERFUNCTIONS

	VI
Adults	10
Children	..

conclusion suggests itself that the pushing of the air against the vocal cords is due to phonetically (poorly) educated voices. Number IV and VI are very rare in children, number V does not appear at all in them. Also these hyperfunctions seem to be the result of an unhygienic voice training. Later we shall at least partly understand the reason for this fact.

In children numbers II and III are very often observed and we must supplement this knowledge with the other one that in reading they get more obvious and that they appear sometimes only in reading. I see several possibilities for explaining this peculiarity. Let me mention therefore another very important experience which everybody can make observing crying babies. Flatau and Gutzmann

emphasized the distinction of soft and hard cries in this age believing that a soft one is a sign of comfort, the hard one a sign of uneasiness. I found that very often the cries begin softly and get slowly or suddenly hard. Nevertheless the hard one is a sign of wanting some help. And this seems inevitable as a sign of distress. In other words the hard cry is associated at least with disagreeable emotions. Unfortunately the association between disagreeable emotions and hyperfunctions of some muscles of the vocal apparatus is and remains throughout life such a narrow one that even a slight degree of these emotions provokes the hyperfunctions! Reading, especially for smaller children, is a sort of strain and evidently sufficient to awake the association above mentioned. Another possibility for an explanation may be the fact that children must, generally speaking, read in school loud enough to be heard from their seat to the teacher's desk. And one can really observe that the voice is therefore generally louder in reading. The higher strain of voice may produce a higher strain of the muscles of the vocal apparatus. These observations must serve as a warning. *Don't neglect the hygiene of voice when you teach reading. Prevent with a hygienic voice education the emersion of hyperfunctions.*

Tables II, III, IV, V, VI, VII, show the combinations of hyperfunctions in the same patient and the number of cases in which the same combination was to be found. Hyperfunctions number II, III and IV are more frequent than those number V and VI. It is interesting that the aspiration of voice nearly always disappears at the moment when hyperfunctions are present. I can't decide if the hyperfunctions are only veiling the aspiration or if the latter really disappear. Pneumographic studies will probably help to answer this question. Number VII was not found in the 488 patients, but I saw this hyperfunction in other cases.

I was also occupied in ascertaining if the same person shows only the same hyperfunctions in singing and speaking. This question has to be denied.

Some observations seem to testify that in tenors and sopranos the hyperfunctions number V and VI are more frequent than in basses and altos. Indeed number V and VI seem to favor tenor and soprano tones and it is probable that some teachers provoke or at least allow these hyperfunctions to reach the desired aim. But all hyperfunctions of the voice-producing muscles are dangerous! They are nearly always the beginning of the decay!

A STUDY OF THE RELATIONSHIP BETWEEN THE SOCIAL COMPLEXITY OF THE ORAL READING SITUATION AND THE SEVERITY OF STUTTERING[1, 2]

EUGENE F. HAHN
Wayne University

Although it is usually accepted at this present day that psychological factors influence the severity of stuttering, additional research to substantiate the existence of such factors is necessary. This investigation was undertaken because it was believed that further information on the psychological factors would furnish data upon which to base practical therapeutic techniques.

The purpose of the study is to ascertain whether stuttering occurrence and frequency are associated with the social complexity of the speech situation. Since propositional speech presented results too complex to correlate, for this study oral reading situations were arranged.

Certain specific questions arose in connection with this problem, to which it was hoped that this study would furnish answers. These questions were:

1. Does stuttering occur when the stutterer reads orally alone?
2. Will the frequency of stuttering increase when the stutterer reads aloud to an unseen listener known to be present?
3. Is the oral reading situation in which the stutterer reads face to face with a single listener more or less difficult in regard to frequency of stuttering than the previous situations?
4. Is the oral reading situation in which the stutterer reads before a small audience of stutterers and non-stutterers more or less difficult than the three previous situations?
5. Are there any cues which a concealed observer can perceive which will indicate attitudes of stutterers toward changes in the social complexity of the situations?

---

[1]Presented at the meeting of the American Speech Correction Association, Chicago, Illinois, December, 1939.

[2]A part of a dissertation completed under the direction of Dr. Lee Edward Travis, in partial fulfillment of a degree of Doctor of Philosophy, University of Southern California.

Procedure

Fifty-two stutterers were tested in four oral reading situations. Forty-two men and ten women participated. Those tested ranged in age from eighteen to thirty-nine. The group was unselected, being made up largely of new cases about to attend speech correction classes at the University of Southern California.

The reading material used in the testing consisted of a selection 550 words in length. Every consonant and common consonant combination appeared in initial position. The selection included exposition in telling a simple story and also fifteen lines of conversation.

To avoid familiarity with the word arrangement and consequent ease in repetition of a selection, Tests 2, 3, and 4, while using exactly the same words as the primary test, contained the words in varying arrangements, each presenting a different pattern of paragraphs and of sentence sequence while telling the same story.[3]

Forty of the cases were tested in a small room in which was a one-way screen, table, two chairs, and a row of lockers blocking off a small space. The concealed observer was seated on the dark side of the screen. If the question arose, the screen was described as a part of the ventilation system. The stutterer was seated at the table, turned at an angle from the screen, about five feet from the observer.

In addition to those tested at the University of Southern California, twelve cases were heard at Wayne University, Detroit. A small office was used, with the observer hidden in the lockers, in one side of which a narrow slit had been cut to afford a view of the room.

The tester attempted to make the tests consistent by giving the same instructions to each case.

Test 1: The tester accompanied the stutterer into the room. The stutterer was handed the test material, asked to sit down and to read the material aloud. He was told to check his own spasms, placing a mark on the paper provided every time he had difficulty. The tester then left the stutterer alone, asking him to come outside to call the tester when he had completed the reading.

Test 2: The tester handed the stutterer the second test material. This time he stood behind the lockers, unable to see or to be seen, acting as a concealed audience for the stutterer.

Test 3: The stutterer was given the reading material and the tester seated himself in the chair directly opposite the reader. Apparently, the tester kept track of the number of spasms.

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[3]Copies of these tests may be obtained from Eugene Hahn, Wayne University.

Test 4: The stutterer returned to the classroom and read Selection 4 before a small group of stutterers and non-stutterers, ranging in number from five to ten. One or more strangers were always present as well as the known class members. The concealed observer came into the classroom as a visitor who was assisting in checking the spasms.

All four tests were conducted with an individual during the same evening period. The tester in twenty-five cases was the author and in the remaining number, an assistant working in the speech correction class. In every case, the stutterer had met the tester previously.

The concealed observer was an experienced speech correction teacher. The method of recording a spasm consisted of drawing a line through the sound on which the stuttering occurred. If the stutterer repeated a sound, held a sound unduly, blocked and omitted a word, or blocked entirely before producing a sound, that sound was checked as it appeared in the script.

In order to check the accuracy of the concealed observer, a non-stuttering student was asked to take one test, marking a hundred words on which to stutter and practicing the selection for one week in order to imitate all types of spasms, both prolonged and brief. This test was read before the observer three times. The first time the observer recorded 101 spasms; the second, 99 of the hundred marked; and the third, 98. The tester and the observer checked spasms in the last instance, the tester recording 97. The 97 spasms were on the same sounds as 97 of those recorded by the observer.

Results and Discussion

The results of the testing in the four situations are shown in Table I. The figures represent the number of words in each 550-word selection upon which stuttering occurred.

In interpreting the data, one finds that the results for Test Situation 1, reading orally alone, show that these fifty-two stutterers on an average experienced stuttering on 25.3 words. The median amount of stuttering for the group was fifteen spasms. The variation in the number of spasms, as measured by the standard deviation, was 31.3 words. The range in the number of spasms was from 0 to 171. Obviously, one can only conclude that these stutterers placed in this situation did stutter. The significance of this conclusion appears to be that stutterers stutter when reading alone, in contradiction to the popular belief that such a situation is free from difficulty.

Thirty-three stutterers had less than twenty-five spasms or stuttered on less than five per cent of the words. Twenty-two of these stuttered on less then ten words. Yet it is surprising that out of the fifty-two stutterers in the group, only three had no difficulty and four had one spasm each. The great variation in the response to the situation is shown in the range of the number of spasms.

TABLE I

NUMBER OF WORDS UPON WHICH STUTTERING OCCURRED IN FOUR VARIED ORAL READING SITUATIONS

(550-Word Reading Selections)

Case Number	Situations 1	2	3	4
1 (f)†	16	56	50	59
2	56	75	87	65
3	36	83	68	67
4	20	55	60	153
5	2	9	11	4
6	3	13	27	36
7	1	13	4	32
8	12	32	37	34
9	14	21	15	15
10	2	4	3	1
11	25	34	34	29
12	1	24	141	225
13	37	55	84	103
14	5	58	57	48
15	3	2	1	22
16	79	70	51	65
17	8	30	51	80
18	4	3	0	3
19	1	101	16	22
20	57	125	96	152
21	3	1	6	8
22	64	86	101	112
23	8	103	81	146
24	15	15	20	27
25	39	59	50	76
26	69	100	54	97
27	23	35	27	77
28	0	4	3	11
29 (f)	17	24	27	51
30	4	4	1	6
31	39	104	101	102
32	21	14	13	11
33 (f)	10	8	3	6
34 (f)	15	64	47	93
35 (f)	1	12	3	9
36	2	9	12	14
37	3	7	9	11
38	9	22	19	13
39	5	8	2	4
40	0	5	15	9
41	2	5	6	4
42	95	126	148	160
43	29	32	31	8
44 (f) (1A)	0	38	56	86*
45 (f) (2A)	171	310	282	347*
46 (3A)	26	19	22	24*
47 (f) (4A)	75	95	110	131*

TABLE I—(Continued)

Case Number	Situations 1	2	3	4
48 (f) (5A)	52	137	134	180*
49 (6A)	45	69	24	23*
50 (f) (7A)	37	82	73	96*
51 (1B)	37	63	37	44*
52 (2B)	16	28	57	78*
Mean	25.3	49	47.6	63.1
Median	15	32	32.5	40
St. Dev.	31.1	52.6	50.8	66.7

† (f) indicates Female.
*following number indicates number is estimated.
(1A)–(7A) were cases unable to complete Situation 4.
(1B) and (2B) were cases who did not complete Situation 4.

The extent to which the unfamiliarity of the surroundings and the fact that the subject was undergoing a test contributed to the incident or frequency of the spasms is not known. These unknown factors lead to interesting speculation as to the occurrence of feelings of insecurity in unfamiliar surroundings and situations, with a probable effect on stuttering.

A positive relationship between the anticipation of stuttering and stuttering occurrence has been treated in the studies completed by Knott, Johnson, and Webster (2), Johnson and Solomon (4), Johnson and Sinn (5), and Milisen (9). The role of cues in stuttering precipitation has been studied by Johnson, Larson, Knott (3), Johnson and Millsapps (6). One may be able to assume from the basis of these studies that such psychological factors as anticipation of stuttering and cues previously associated with stuttering affected the stutterers' responses to Situation 1.

In discussing the responses of stutterers in Situation 1, attention should be called to the effect of certain changes in speech pattern upon stuttering frequency. Johnson and Rosen made such a study (7), reporting that the use of slow, whispered, and rhythmical speech patterns resulted in decrease of stuttering frequency. Some of the stutterers spoke more slowly, with less vocal effort, and occasionally with a strong rhythm pattern, in Situation 1 than they did in the other three situations. Consequently, this change of pattern may have contributed to the lessening of stuttering occurrence.

In Test Situation 1 the stutterer was asked to record the number of his own stuttering spasms. However, the notes of the observer and the random selection of twenty cases showed that the stutterers usually underestimated the number. Often the observer noted that a case would record only the prolonged blocks, overlooking, perhaps unconsciously, the more brief repetitions and quick blocks.

The following chart compares the number of spasms the stutterer recorded himself to the number recorded by the concealed observer.

Case Number	Number of Spasms Recorded by Stutterer	Observer
2	7	56
9	4	25
11	4	14
14	1	5
17	6	8
18	3	4
19	1	1
20	54	57
21	2	3
24	3	15
26	18	69
27	19	23
31	27	39
37	2	3
38	2	9
39	3	5
47	69	75
48	35	52
51	21	37
52	7	16
Mean	14.5	25.3

Such figures as these indicate the reason why the stutterer's own recording of his spasms could not be used in this study and show that the use of the observer is a necessary part of the testing procedure.

In speculating as to the causes of such discrepancy in recording spasms, one would guess that some of these stutterers forgot to record their spasms until they had a prolonged block. Others, in taking the test, may have desired to minimize their scores, justifying this to themselves by saying that they "had not really stuttered on a word, but had only hesitated."

Again, many stutterers may be entirely unaware of their minor spasms.

The question arises as to whether or not the observer was in error in checking the occurrence of spasms during the tests. Naturally there is human variability in visual and auditory discrimination. Certain precautions were taken to minimize errors. The observer selected was an experienced speech correction teacher. She had had practice in checking stuttering spasms both with stutterers and with non-stutterers who imitated spasms on preselected words. It was felt that the combination of both the auditory and the visual observations would rule out many of the errors that might have been made on the basis of hearing alone.

The data gathered from Test Situation 2, in which the stutterer read to an unseen single listener known to be present, showed that fifty-two cases on an average stuttered on forty-nine words. The

median for the group was thirty-two spasms. The cases varied by 52.6 words, as measured by the standard deviation. The range in number of spasms was from 1 to 310. The conclusion drawn was that the frequency of stuttering increased from Situation 1 to Situation 2 by 23.7 words or 94 per cent. The standard deviation increased by 68 per cent. Thus Test Situation 2 approximately doubled the amount of difficulty experienced in Situation 1. It would seem that the increased complexity of the social element in this situation was associated with a greater amount of stuttering.

Situation 2 might be compared to one created by Steer and Johnson (1) in their study, in having the stutterer make a phonographic recording of his reading. This indefinite audience situation was associated with an increased amount of stuttering.

Certain cues recorded by the concealed observer gave evidence of the increased complexity of this situation over Situation 1. Some stutterers increased the volume of their voices, using the articulatory mechanism more vigorously in an attempt to reach the listener behind the obstruction. Whereas some stutterers read very softly and slowly in Situation 1, setting an easy rhythm for themselves and relaxing their bodies, these same cases increased their rate, their bodily tension, and lost their established rhythm in Situation 2.

Results obtained from Test Situation 3, in which the stutterer read directly to the tester, showed that on an average the fifty-two stutterers had difficulty of 47.6 words. The median for the group was 32.5 spasms. The variation as measured by the standard deviation was 50.8 words; and the number of spasms ranged from 0 to 282. The conclusion is that this situation caused a substantial increase in frequency of stuttering over Situation 1, but that the difference between Situation 2 and 3 has no statistical significance.

Although for the group, Situations 2 and 3 appeared very similar, some individual cases varied distinctly in response. For example, Case 19 had far more trouble with an unseen audience than with a known audience. In contrast, Case 12 experienced more spasms when he faced his listener. Individual differences in attitude to Situations 2 and 3 probably varied widely. Porter (8) found that the subject's evaluation of a listener as to whether that person was "hard" or "easy" to read to, tended to be consistent with the relative frequency of stuttering. If this is generally true of stutterers, one can understand the great variation in responses to these four test situations.

The concealed observer noted that some stutterers decreased their volume from Situation 2 to 3, speaking in a more modified tone to a closer audience. Others made no difference in volume. Some appeared to be more at ease, showing freedom from general bodily tensions and oral strain because of the proximity of the listener, while others displayed greater confusion and tension, increased rapidity, and loss of interpretive inflections in their reading.

Although these observations were subjective, they may account in part for the wide variation in the number of spasms.

The data obtained from Test Situation 4, in which the stutterer read before a small group, showed that this situation was more difficult than any of the other three. The average number of spasms was 63.1; the median was 40. The number of spasms varied by 66.7 words, as shown by the standard deviation. The number of spasms ranged from one to complete inability to speak within a reasonable time, or to an estimated 347 words.

Situation 4, as judged by the number of spasms, was approximately 33 per cent more difficult than Situation 3. Situation 4 showed an increase over Situation 1 by 150 per cent, while the standard deviation increased from the first to the fourth situations by approximately 112 per cent.

Twenty-two individuals did not find the reading before the group any more difficult than reading in another of the situations, but for twenty-five, the increase in number of spasms was pronounced.

The results agree with the findings of Steer and Johnson (1), and Porter (8) that the larger audiences are associated with increases in stuttering frequency. Notes of the concealed observer substantiate what Steer and Johnson believe are subjective factors significantly related to stuttering severity. It was seen that there was greater muscular effort and strain and signs of general emotionality in Situation 4. Also before the group, the stutterers probably had a greater desire to keep from stuttering than they had when speaking alone. Steer and Johnson believe that such a desire precipitates a greater amount of stuttering.

It should be pointed out that seven stutterers were unable to complete Test Situation 4 before the group audience. Four were unable to proceed because of extreme emotionality, and the other three blocked so that speech was no longer possible at that time.

The intercorrelation between the various situations was:

Test Situation	1.	with	Test Situation	2.	....	.74
"	"	1.	"	"	"	3.	....	.67
"	"	1.	"	"	"	4.	....	.51
"	"	2.	"	"	"	3.	....	.78
"	"	2.	"	"	"	4.	....	.69
"	"	3.	"	"	"	4.	....	.91

While the average, .72, shows a certain amount of consistency in the number of spasms for these stutterers in the four situations, the coefficient of alienation for a mean of .72 is approximately .70, which indicates that there is enough absence of correlation among the various test situations, or that individuals reacted differently from situation to situation.

In comparing the relative influence of individual differences on the number of spasms as contrasted with the influence of the different test situations, it was found that individual differences affected the number of stuttering spasms in the four situations more than did

the differences in situations. The extent of dependence of the number of spasms on the test situations is indicated by the correlation ratio .285. The extent of the dependence upon individual differences is expressed by the correlation ratio .825. Both are significant correlation coefficients.

The same result can be obtained by a different approach, that of analysis of variation (10) of the spasms in the four situations. According to this analysis, the variation due to individual differences is 68.1 per cent; that due to test situation differences, 8.1 per cent; and that due to unknown factors, 23.8 per cent.

A speech clinician studying these findings, noting the wide range in individual responses to these varied situations, will realize that although the varied complexity of the social situations should be considered in remedial treatment, the emphasis should be placed upon meeting the needs of the individual stutterer.

Summary

Fifty-two adult stutterers each read prepared reading material consisting of four varied tests, 550 words in length.

The situations constituted: reading alone, reading before an unseen listener known to be present, reading directly to a single listener, and reading before a small group of stutterers and non-stutterers. A concealed observer checked the number and location of stuttering spasms for each reading.

On the basis of this study, the following conclusions are offered:

(1) Stutterers experience stuttering difficulty while reading orally alone.

(2) Stuttering becomes more severe when a stutterer reads aloud to an unseen audience than when he reads aloud alone. In this investigation, the frequency of stuttering increased by 94 per cent from reading alone to reading before the unseen listener.

(3) The frequency of stuttering varies little from a situation in which an individual reads to an unseen audience to one in which he reads directly to a single listener. However, there is a substantial increase in stuttering occurrence in reading directly to a listener as compared to reading alone.

(4) Stutterers have more stuttering difficulty in reading before a group than they experience in reading alone, in reading to an unseen listener, and in reading directly to a single listener. In this study, the number of spasms increased by 150 per cent from the situation involving reading alone to that involving reading before a group.

(5) Stutterers do not seem to be able to record the number of their own spasms accurately.

(6) Observers can perceive stutterers' overt responses indicative of emotional reactions to the social complexity of the oral reading situations.

(7) The variation in the number of spasms is significantly more affected by individual differences than by differences in the social complexity of oral reading situations.

The writer wishes to acknowledge the assistance of Dr. William Reitz, Wayne University, in the statistical analysis.

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CORRECTING NERVOUS SPEECH DISORDERS. By MABEL FARRINGTON GIFFORD. New York: Prentice-Hall, Inc., pp. 197, 1939. $2.85.

This book on the correction of stammering is written by the Chief of the Bureau for Correction of Speech Defects and Disorders of the Department of Education of the State of California. It is addressed to teachers and it is largely a presentation of class room technique. There are two excellent chapters on home co-operation. Little attention is given to the etiology of stammering and no distinction is made between primary and secondary stammering.

The endeavor of the therapy is to replace the "old blockade pattern" with a "new fluency pattern." The blockade pattern consists of inner turmoil, tense body, inhibition of breath, tense mouth, long phrases, and too rapid speech without pause. The fluency pattern consists of still feeling, relaxed body, breathy outpouring, passive mouth, short phrases, and pauses between phrases. There is considerable emphasis on suggestion and the book abounds in enthusiasm.

Despite the title of the book the subject of speech disorders is not considered from a medical viewpoint, nor is there a critical scientific approach. —C. S. BLUEMEL, M. D.

THE DEVELOPMENTAL SCHEDULE AS A CLINICAL INSTRUMENT

ELIZABETH D. MCDOWELL, Ph.D.

Developmental schedules used for clinical purposes differ in significant ways from their prototype, the developmental schedule of the research laboratory. Variations between the two may be classified as: (1) those of purpose and objectives, (2) of bases for selection of items to be included, (3) of organization of data to be observed, (4) of techniques for administration, (5) of interpretation and evaluation.

Purposes implied in the terms "developmental" and "schedule" are shared by both the research and the clinical instruments, consequently both are designed to make clear "symptoms of growth," and to indicate how each item is an effect of its predecessor in the series and how it affects the nature of the behavior which follows in the chronological order of appearance. They differ in objectives, however, in that research schedules are directed toward the aims of the cycle of scientific activity—experimentation, generalization, prediction, verification while clinical instruments are primarily concerned with the processes of diagnosis and therapy. One is for analysis and description, the other for a program of action. One concentrates on the phenomena of the past, the other upon the possibilities for the future. The former is for the maker of clinical instruments, the latter for the user of his product. While both are directed toward the study of "longitudinal development," the clinical instrument is more concerned with interpretations of the child's behavior in terms of his own growth curve than in terms of a norm derived from mass measurements; it compares his level of development with what he was, rather than with what the "average" child of his chronological age can do.

These differentiations in purpose are reflected in the choice of behavior units which make up the list of observations to be made for each schedule. Single isolated bits of behavior (such as "picks up pellet," "vocalizes," "focuses attention on face of experimenter") which make up the research instrument are replaced in the clinical schedule by certain "*abilities*" which determine successful participation in an act of speech, for the clinician is concerned with satisfactory solutions to problem speech situations rather than with mere identification of reactions in their chronological order of appearance. "Acts of Speech" are efforts made by one person to say something to another person for the purpose of getting a more or less definite

response. They, therefore, have four elements; a speaker, a listener, a purpose, and something to be said. Success in attaining the purpose of an act of speech is dependent upon the ability to so co-ordinate isolated bits of behavior that they achieve satisfaction for the speaker. Acts of speech appear somewhat later in the child's schedule than do isolated bits of language or communicative behavior. When a state of "readiness" for participation in an act of speech has arrived, the average child has already performed 28 acts of specific linguistic behavior, 36 of physical activity, 59 of visual, tactile, auditory and kinesthetic perception and exhibited 15 different kinds of more or less complex adaptive behavior patterns. It is this next step of combining these isolated bits of behavior into units which enable the speaker and listener to achieve the purpose of the act of speech that this writer has found most productive of desirable clinical results. To these units she has given the name "abilities" in as much as they are evidences of powers for controlling an act of speech and the circumstances (or context) in which it occurs. Sixteen such "abilities" make up the repertory of most well-adjusted human beings according to the experience of this writer; among them, the ability to converse pleasantly, to report information, to exchange opinion, to make a complaint, to express recommendation for action and the like. Around these prime abilities cluster a group of contributing abilities and a body of basic knowledges, skills, sensitivities and attitudes supporting them. Let us take for example the ability to converse pleasantly—an organization of the ability to listen courteously, to greet other participants, to take leave graciously, to interrupt courteously, to disagree without being disagreeable, to encourage others to contribute and the like. These contributing abilities are built upon a body of factual information about the rules of social usage and the ways in which certain kinds of conduct will be likely to affect the behavior of others, upon the mastery of basic skills such as speaking fluently, with pleasant and adequate voice control as well as upon certain attitudes toward the activity predisposing one to behave in sociable fashion.

Each of these abilities has a career, the progress of which is measured by the complexity of the situations (or context) in which the ability can operate successfully. Development thus becomes a process of dealing more and more successfully with more and more complex situations and the order of the schedules for growth in speech proficiency is a list of situations of graded difficulty. First steps in ability to converse pleasantly would be exhibited in a situation where an infant seeks actively to win smiling attention of a familiar person with whom he has already established rapport and by vocal display and facial gestures tries to win approval of "nice kitty," or "see kiddy car." As development proceeds he can establish a sociable relationship with strangers, or with familiars who are not in rapport, or with a group of his peers; at the same time he has acquired more topics of conversation and asks questions about more complex subjects as well as about more things in the physical environment. Factors

contributing to his problem are the number and familiarity of his fellows in the activity, the diversity of the purposes of the participants, discomforts in the physical environment, and conflicting attitudes and mind sets. The developmental schedule is a graduated list of such type situations or problems with a description of the contributing abilities, and the basic skills and knowledges required for satisfying participation.

Administration of the test or observation procedures means setting up a "context" in which the subject will have to meet the problems for which he has asked the clinician's help. One who complains that all attempts to converse end in conflicts or "arguments" will be provided with opportunity to participate in such activity and will receive a list of the shortcomings of his performance in contributing abilities (such as that of phrasing a disagreement so that it does not inhibit expression from others), or will be given information about the canons of good taste in regard to interruptions, or will receive practice in producing smooth rhymthical patterns of speech with appropriate melodies. The schedule with its suggestions for attaining higher levels of proficiency will constitute the remedial program which the pupil will take with him so that he can answer for himself "how am I doing?" and "where am I going?"

The writer has found the ability schedule most helpful in dealing with difficulties of psychogenic origin, but a similar arrangement of the processes of the basic motor skills is equally helpful in building habits of fluent speech among spastics, or in lowering the pitch of voices. It serves as a journal or log of the clinical interviews, as a "lesson assignment" for the pupil and as comprehensive and integrative analysis of the teacher's job.

BOOK REVIEW.

A HANDBOOK OF VOICE AND DICTION, F. LINCOLN D. HOLMES, F. S. Crofts & Co. 1940. pp. viii plus 279. $2.00.

This book casually associates the auditory results of the process of phonation with the physiology and physics of voice, but the brief discussions of these phenomena in the text need amplification and clarification.

The seven chapter titles are: Establishing a Point of View; Habits Fundamental to Effective Voice Production; Causes and Remedies for Faulty Types of Voice and Speech; Vocal Variety: How to Acquire It; The Production and Use of Speech Sounds; Deviation from Acceptable Vowel Sounds; and, Deviation from Acceptable

Consonant Sounds. At the end of each chapter there are "Questions for Study and Review," and "Selections for Practice."

> "The fundamental thesis of this book is that voice production is inexplicably bound up with the struggle behavior of the individual, and that the laryngeal musculature operates first in struggle reactions. The conclusion follows that training in efficient use of the musculature for speech purposes is essential." p. v.
>
> "*Efficient voice production requires the matching of an optimum amount of resistance on the part of the laryngeal valve with an optimum amount of pressure on the breath stream.* On the other hand, struggle behavior demands a maximum resistance of the valve to the passage of the breath stream. Therefore, this conflict between the two uses of the laryngeal valve presents the greatest single problem affecting good voice production." p. 19.

The term "struggle" broadly covers such diverse activities as physical exertion, emotional states, and deliberation.

The program of "training in the efficient use of the musculature" considered essential is composed of eight major objectives: "(1) The laryngeal valve musculature must be trained to operate during phonation with an optimum of relaxation (an "open throat" must be established). (2) The use of one's optimum pitch level or key must be learned. (3) Breathing habits which can be relied on in emotional situations must be established." These first three are basic to the remedial procedures of the book. The remaining five of the eight major objectives have to do with abilities in pitch range, ability in articulation, use of acceptable speech sounds, variety of rate, and skill in the use of loudness. On page 66 this statement is found:

> "If our range is at all wide, i. e., if the number of musical intervals between our lowest and highest pitches is great, the placement will vary from low down in the throat for the low pitch, to the back of the mouth, to the midpoint in the mouth as we continue up the scale, and will be at the 'hook' of the palate when we reach our optimum pitch level. As we proceed up the scale from that level, the placement will continue forward and upward until, for a tone produced at a pitch level about a *musical fourth* above our optimum pitch level, it will seem to be completely out in front of our faces."

The reviewer believes imaginative devices of this type do not accomplish their ends and create confusion in the student's thinking.

—PAUL MOORE.

A CRITIQUE OF THE RATIONALS OF TESTS OF HEARING

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I propose to discuss today the standard practices of group audiometry. The usual procedure is to apply to the group of persons to be "audiometered" a so called screen test that is intended to weed out from the group all those persons who should be retested with an individual test that furnishes a more analytical picture of the auditory acuity. There are several forms of this screen test. By far the commonest in use is the Western Electric 4B audiometer, an instrument that plays phonograph records for the subjects to listen to through sets of phones. The records played are of numbers spoken, some by a man and some by a woman. The numbers are arranged in eight lists, four for each ear, and in each list they are graduated in intensity by three decibel steps from a level of 30 decibels to a—3 decibels (or at least the official Western Electric test forms indicate that these are the levels tested in each list). The person tested listens through his telephone set and writes down the numbers he hears. The test is then scored by comparing what the subject heard with what was actually spoken into the record.

In a state-wide study of the deaf and hard of hearing in Wisconsin financed by the Works Progress Administration and sponsored by the University of Wisconsin and the State Department of Public Instruction some 10,000 of these tests have been given to date. We then have figures on which to evaluate the technique statistically.

The first requirement of any good test is that it be reliable: that is, on repeated administration to the same persons that it yield the same, or nearly the same scores, or that similar chance halves of the same test yield similar scores. Our first study, based on two administrations of the test showed a co-efficient of reliability, on two administrations of the test, of +.31 with a probable error of .06, and on measures of chance halves, of +.86 with a probable error of .026. These co-efficients were based on the Western Electric method of scoring the test papers. Since both of these correlations were low, considering the conditions under which the two measures were taken, an inspection of the papers was made to see if some other method of scoring, than that recommended by Western Electric, might be employed to raise the reliability. It was discovered that the graduated lists of numbers were not being missed in the expected order of difficulty. List number one, for example shows the following

discrepancies in order. The first pair of numbers is easiest to hear, that is, stands first in order of correct responses. The second pair is either 2nd or 3rd in order. The 3rd is 4th. The 4th is 2nd or 3rd. The 5th is 5th. The 6th is 7th. The 7th is 8th. The 8th is 6th. The 9th is 10th. The 10th is 11th. The 11th is 12th, and the 12th is 9th. Thus only two of the pairs of numbers are in their intended place on the list. In all the four lists for the right ear, which was the only ear we studied in this statistical survey, significant changes of the order of difficulty were found. Various methods of rescoring the papers were tried, in which the actual degrees of difficulty of the various numbers, rather than their Western Electric decibel ratings, were taken as the basis for the scores. These methods of refinement of the scores did not increase the reliability of the test. We assumed therefore that the lack of reliability of the test was not resident in the scoring system, but was intrinsic in the test itself.

In the search for variables that might possibly be the source of this lack of reliability the following conditions were taken into consideration:

1. The varying efficiency of different phones in the network attached to the audiometer.

2. The differing conditions of room noises.

3. The uncertainty on the part of the person tested as to what he is to do in the test, when he is to listen, and where he is to write the numbers he hears.

4. The lack of even graduation of difficulty of the numbers used in the test. This failure of even graduation apparently causes many of those tested to believe they have reached their limits at the first number they cannot hear. After that, not knowing when the numbers are to be spoken they become confused and erratic in their responses.

In the attempt to correct the first variable, that of the efficiency of the phones, they were given regular monthly checks, and were not sent out into the field unless their deviation from standard acoustic output was less than two decibels. Often phones came in from the field more than five decibels below standard and occasionally completely dead. Naturally the dead phone is not so serious a source of error as the one that is merely below standard.

2. As to variable room noises nothing could be done that was not already being done about the conditions under which we were obliged to operate. Every possible reduction of noise was effected—even the scratching of the pencils was reduced by putting blotters under the test blanks.

3. To reduce the variable of uncertainty of response a new phonograph record was cut in which the numbers were given one at a time instead of in twos or threes and before each number was spoken there was sounded a musical note, of 600 cycles. Then the person tested knew when to listen for the number spoken. If he was unable to hear one or two of the numbers in the series, he at

least knew which spaces on his paper to leave blank and he knew when to listen again for another number. The musical note was loud enough so that, if he could take the test at all, he could hear it, and it never varied in intensity throughout the test. The sounding of this note served as an assuring guide for the person taking the test. Furthermore it gave him a feeling that the record was not as difficult as the Western Electric record. Children testified that they liked the test better when administered with this record. It is likely, then, that this technique enabled the one tested to come closer than with the original record, to his maximum auditory performance.

When we came to the solution of the last problem of variability, that of the lack of even graduation of difficulty of the test record, we discovered that this lack was due to the presence of two uncontrolled variables that were super-imposed upon the controlled variable of attenuation. In the 4B test as each list is spoken the recording circuit is gradually more and more attenuated until the level of —3 decibels is reached. Now if the same two numbers were used at each stage of attenuation and were spoken each time with the same intensity and inflections, then the lists could be evenly graduated. But, if the same two numbers were used level by level, the test would obviously be of no significance. When one introduces different numbers at different levels, he introduces two variables that ruin the graduation of the lists. These variables arise from the fact that the numbers used in the test vary greatly in (a) inherent intelligibility and (b) in confusability. The intelligibility of a given number depends upon the phonetic power of the sounds of the number and the distinctiveness of its acoustic pattern. The confusability of the number depends upon its resemblance to other numbers in the list. To be a well graduated test then, each given level of attenuation in every one of the eight lists should have on it numbers of the same intelligibility and of the same confusability. If that were accomplished then the graduation would follow the attenuation exactly; but in the 4B test such a balancing of levels was not accomplished. Examples:

The numbers 6 and 2 are the most often missed, counting omissions and substitutions. The numbers 5 and 1 are the least often substituted for. Level No. 11 on the test, the level of attentuation that is supposed just to be heard by the person of normal hearing has, in its eight pairs of test digits, seven 2's, four 6's, and only one each of the rest of the test digits; while the next level, that of —3 decibels of attenuation, has only three 2's and two 6's, but has three 5's and two 1's. Thus the attenuation of the last level is counteracted by the selection of numbers that are spoken on this level and on the one above it.

We were well aware, too, that the relative intelligibility of the numbers may vary from person to person, particularly with children, depending upon the experiences they have had with numbers. The same might also be said of the confusability. It seemed obvious therefore that some way must be formed to balance the test by using

identical numbers on each level. In order to do this without giving the one tested a cue to the correct answers, we used all the seven numbers that were used on the 4B record, viz., 1, 2, 3, 4, 5, 6, 8. These appeared in haphazard order at each level; but at each level one of the numbers appeared twice, at each level a different number. This repetition of one of the numbers apparently conceals the system of the test from the person being tested. Thus we have a record in which there is practically no other variable except seven level-by-level decreases in intensity. For the purpose of this report let us call this the balanced test. We scored this test by assigning arbitrary values to failure of correct response at each level, failure at the level of greatest attenuation being scored 1 per number, at the next level 2 per number, etc.

The co-efficients of reliability for the balanced test, based on the chance halves method, is +.98 with a probable error of ±.003. This is a raising of the reliability over that of the Western Electric test of .12. A measure of reliability on the basis of two administrations of this test to the same group has not yet been done.

The comparative reliability of the two tests, the 4B versus the new, balanced test, is again shown by the curve of level-by-level progression of difficulty in the test, the 4B test showing a broken line and the balanced test showing a smooth curve.

Our next concern is with the availability of the number test as a screen. How well does it correlate with the 2A individual test for which it is to serve as preliminary? The Western Electric 4B test, with the Western Electric scoring yielded, with 1000 school children who had achieved low scores on the screen test, a correlation of +.36 with a probable error of .053. Two different revisions of the Western Electric scoring taking into account the actual difficulty of each number yielded correlations of +.28 ±.06 and +.43 ±.53. The correlation between the balanced test and the 2A test on the basis of 300 school children who had gotten low scores on the Western Electric 4B test was +.23 with a probable error of .08.

Thus, in spite of the increased reliability of the balanced test over that of the Western Electric 4B test, we learn that it is no better as a screen. Apparently we have here two sorts of tests: (1) the 2A audiogram, an analytical study of the acuity of hearing at sample frequencies throughout the speech range, and (2) the phonograph number test, a test of practical hearing. Three reasons may be adduced for the failure of correlation of these two tests.

1. The 2A is a test of acuity for pure tones presented singly at thresholds of the hearers acuity to the several tones. The number test, as does any practical hearing, involves the listening to sounds most of which are complex tones at intensities far above the threshold.

2. The 2A, if properly administered, tests only the integrity of the auditory apparatus, as such, including the primary auditory areas of the brain. The number test may test, not only what is tested

by the 2A, but also the associative and interpretative functions of the brain. Especial facility in these secondary functions may compensate for loss of sensory acuity, and disability in these functions may render partly or wholly ineffective a normal sensory equipment. Thus two persons who test the same on the 2A may differ markedly in practical hearing.

3. The 2A makes few demands upon the intellectual faculties beyond the power to pay attention to the test. The number test doubtless is taken more accurately by a person of high mentality than by one of low. The bright child will make inferences from what he actually does hear as to what probably was spoken, although the level of attenuation be such that unless he remembered what words were included in the test he could not possibly recognize them.

The original purpose of the 2A audiogram was to furnish the otologist with a detailed picture, frequency by frequency, for each ear, not so much for an estimate of hearing loss for speech, but for a measure of the extent of damage that some pathology has rendered in the organ of hearing or for a measure of the change of acuity that follows some program of therapy. Thus the use of the 4B or any other spoken word or number test as a screen for the 2A or as a screen for any similar pure tone test may be quite footless. It may be like using the heart rate as a measure of the patient's fever instead of using a thermometer. There is a correlation between rate and temperature but in many cases the correlation breaks down.

On the basis of our experiences therefore, we would advise that the screen test to be used be selected in terms of the final objectives of the hearing survey. If the purpose is to find those cases that need medical study, then the screen should be one that tests pure tones at various frequencies and intensities. If the purpose of the survey be to assay the educational handicaps from which some of the pupils of a school system may suffer by reason of their hearing impairments, then the screen to be used should be of word test type. If both objectives are in view, both screens could be well used, and they may conceivably sort out the same children, but in many cases may point out different ones as in need of individual follow-up study.

There are several ways of accomplishing a screening using pure tones. One way is to generate tones, either through the agency of a phonograph record or directly from an oscillator, and communicate them to the subjects through their head phones. Each person tested has a blank before him with numbered squares. He takes the squares in order as and when he is directed. In each square he writes whether or not he heard a tone at that particular part of the test. He is warned that for many of the squares there will be no tone sounded. The frequencies of the tones vary so as to cover the entire speech range, but all tones, when sounded, have an intensity of 20 decibels. All the subject needs to do is to write **yes** when he hears a tone, **no** when he does not. An inspection of the test papers will roughly show which of those tested had a hearing loss of less

than 20 decibles at the frequencies tested. The rest may be retested on the individual pure tone audiometer. If the screen need be coarser or finer, the intensity of the test tone can be lowered or raised. Since this is a writing test it cannot be used with young children.

Another scheme is similar to this except that the test tone is sounded in variety of simple patterns like this: —— —— ——, —— ——, ——. The subject makes lines in appropriate squares to conform to the patterns he heard. The difficulty with this method is that a room noise or other disturbance may prevent the subjects hearing the complete pattern though he hears the tone.

Another method is to have the tone vary in inflection and to ask the person tested to mark the inflection in the appropriate square on his blank. Some tones are level, some slide up through an octave, some slide down an octave. The subject makes a level line across his paper, if he hears an even tone; he makes a line slanting up from left to right, if he hears a upward inflection; and a line slanting downward if he hears a downward inflection.

A test designed along these lines is now being developed.

Thus, in conclusion, we would say (1) that in group audiometry the practice of giving phonograph number tests as a screen for the pure tone frequency test should be discontinued; (2) that a good group number test should be used as a screen for some practical test of the hearing of speech; and (3) that as a screen for the individual pure tone frequency test a group pure tone frequency test should be used.

NEWS AND NOTES

Dr. Kurt Goldstein, Dr. Emil Froeschels, Dr. Ralph Sokolowsky—Three of Europe's Foremost Speech Pathologists Locate in America.

Dr. Kurt Goldstein, one of the world's most outstanding authorities on *Aphasia*, was the first to arrive. He immediately set up private practice in New York where he has since remained. Especially well known for the articles and works he has published on that subject, his contributions may be expected to materially enrich our future American publications. The Journal of Speech Disorders invites him to make use of its pages for publication of any experiments, therapeutic studies or other articles in the field, of whatever nature he cares to release. His arrival is particularly fortunate in view of the untimely death of our Dr. Weisenburg.

Dr. Emil Froeschels is too well known among both those of us in the major field of Speech Pathology, and those in minor Speech Correction, to need any introduction in America. The fact that he long ago had his books translated into English, and had others published in this country, in the number of which publications he was so prolific, made his name seem almost one of our own group, long before his arrival. Central Institute in St. Louis under the able direction of Dr. Max Goldstein, our former president, profits especially by his presence, since he arrived under contract to join the staff of that splendid institution. From Italy came also another to join this same staff, in the person of the former assistant of Dr. Froeschels in the famous medical school of the University of

(*Continued on page 42*)

SPEECH REHABILITATION IN THE RURAL SCHOOLS OF WAUKESHA COUNTY, WISCONSIN

J. ADELBERT YOUNG
County Speech Clinician

Five years ago speech rehabilitation work was introduced in the city schools of Oconomowoc. Two years later, a campaign was started to introduce the work in the county.

Nine obstacles were encountered and had to be removed. They were:

1. Lack of administrative attitude in respective schools in agreement with the need for speech rehabilitation.
2. Lack of rural teachers having sufficient preparation necessary for participation in a program for speech rehabilitation.
3. The already crowded schedules of activities in the one-room rural school.
4. Inadequate knowledge of speech rehabilitation by entire rural populace. (Thought it was another frill.)
5. An indifferent county board.
6. Inadequate facilities.
7. Large territory with scattered one-room schools.
8. No state aid and insufficient funds in county.
9. General questions:
   a. Is there a need?
   b. What will it cost?

The procedures used in overcoming these obstacles were:

1. Met all teachers and interpreted the work to them and explained the types of speech defects common to school children.
2. Gave series of talks to several P. T. A.'s.
3. Spoke at School Board convention on "Need for work and a recommended procedure."
4. Made a speech survey so as to answer:
   a. What is extent of problem?
   b. How many speech handicapped children are there and how many may be expected in any represented group?
   c. What type of speech handicaps may these children be expected to have and in what proportion do the different types occur?
   d. What can be done for these children?
   e. How much will be needed to finance the work?

f. How a speech handicap is both a social and economic handicap in life.
g. How speech handicaps retard progress.

5. Miss Ward assisted in "Hard of Hearing" survey.

The following charts will give you a detailed picture of the survey, which was financed by the Oconomowoc Kiwanis Club.

SCHOOL CENSUS

Type of School	No.	Enrollment	Speech Cases	Hard of Hearing Cases
One-room	81	1,999	121	35
State Graded	28	2,487	118	40
High Schools	5	1,562	99	30
Parochial	15	3,505	150	50
Total	129	9,553	488	155

HARD OF HEARING

Number of schools tested	129	
Enrollment	9,553	
Number with defective hearing		155
Serious loss—Repeated 1 or 2 grades	72	
10-20 decibel loss	77	
Less than 10 decibel loss	6	
High Frequency loss	39	
Recommended for lip reading	61	
Transfer to hard of hearing classes	11	

SPEECH SURVEY

Number of schools tested	129	
Enrollment	9,553	
Total cases defective	488	

Type	Boys	Girls	Total
Lisping	50	30	80
Foreign Language Influence	58	32	90
Retardation	8	4	12
Sound Substitution	31	41	72
Vocal Disturbance	35	13	48
Spastic	6	4	10
Stuttering	40	16	56
Rhinolalia	35	47	82
Clausa	20	30	
Aperta	15	17	
Oral Deformities	12	8	20
Cleft Palate	4	0	
Malocclusion of teeth	3	5	
Miscellaneous	5	3	
Aphasic	8	3	11
Behavior Problems	10	2	12
Hearing Deficiencies	30	25	55
Duplications	40	20	60

DEFECTIVES PER TYPE OF SCHOOL

Type	One Room	State Graded	High School	Parochial	Total
Stuttering	12	11	9	24	56
Foreign Language Influence	30	20	2	38	90
Sound Substitution	20	21	1	30	72
Lisping	15	18	20	17	70
Spastic	2	2	0	6	10
Aphasic	3	5	0	3	11
Behavior Problems	1	3	5	3	12
Lip Reading	12	20	15	14	61
Retardation	6	2	0	4	12
Rhinolalia	10	15	30	37	92
Vocal Disturbances	8	10	12	8	38

DEFECTIVES PER GRADE

Grade	Enrollment	Defectives		
		Boys	Girls	Total
Kindergarten	107	12	10	22
First	1,087	41	32	73
Second	1,000	25	29	54
Third	997	30	28	58
Fourth	941	26	20	46
Fifth	1,018	33	20	53
Sixth	984	29	7	36
Seventh	990	15	12	27
Eighth	889	16	11	27
High School	1,532	91	53	144
Ungraded	8	5	3	8
Total	9,553	323	225	548
Duplication		40	20	60
		283	205	488

The actual outcome of all this work is:

1. A department for speech rehabilitation and a department of lip reading for the hard of hearing have been established as non-profit organizations operating under the supervision of the State Department of Public Instruction and in close co-operation with the Department of Speech at the University of Wisconsin.
2. A main center has been established at Oconomowoc where the files and equipment are kept. Here, also, are the offices of the allied workers.
3. Ten sub-centers are established.
4. A transportable clinic is being purchased by the Oconomowoc Kiwanis Club.

The diagnostic details can best be explained by the following outline:

A. Diagnostic Procedure.
   1. Testing.
      a. Preliminary.
         1. Stimulation is provided so that there is an outpouring of expression straight from life.
         2. Talk about subjects alive to students.
         3. Play games.
         4. Dramatize sounds.
      b. Formal testing.
         1. Read sentences containing sound units.
         2. Pictures for sounds.
         3. Intelligence test given.
         4. Personality inventory taken.
         5. Hearing tested.
            a. 2 A and 4 A audiometer.
            b. Seashore tests.
         6. Testing for diagnostic technique.
            a. Physician.
            b. Dentist.
            c. Psychiatrist.
            d. School psychologist.

B. Case history taken.
   1. Language background.
   2. Behaviorism of student and family.
   3. Personal history.
   4. Health history.
   5. Speech history.

C. Recording.
   1. Diagnostic chart.
   2. Case history chart.
   3. Hearing chart.
   4. Speech chart.
   5. Personality chart.
   6. Intelligence chart.

No concrete specific therapy can be outlined. However, we do follow certain generalities as:

1. Situation discussed sincerely with teachers and parents.
2. Child stimulated to co-operate by creating a desire to make modifications in the direction to better speech and voice.
3. Create an atmosphere as will make the student feel that he is not inferior or excluded from rest of group.

STUDIES IN THE PSYCHOLOGY OF STUTTERING, XVI.

Rhythm as a Distraction in Stuttering[1]

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Introduction, Experiment II[2]

The purpose of this study was to investigate the effectiveness of various kinds of rhythms as distractions in stuttering, effectiveness being measured in terms of the reduction in frequency of stuttering. Three general types of rhythm were used: bodily rhythms, speech rhythms, and rhythmic sensory stimulation. Gross bodily rhythms, such as walking and the arm swing, were used as well as rhythmic bodily activities of lesser amplitude, such as tapping the foot and the hand-wrist swing. Two types of speech rhythm were studied: the sing-song rhythm (every other syllable accented), and an accent on every third word. Rhythmic sensory stimulation was imposed in each of three sense modalities: vision, audition, and touch. The subject synchronized his oral reading with these various rhythms.

Subjects and Procedure

The subjects were 18 stutterers from the University of Iowa Speech Clinic. There were two female and 16 male subjects who ranged in age from 14 to 33 years, their average being 22 years.

Each subject read 15 different passages—three 500-word passages (one in each of the control situations) and twelve 250-word or 250-syllable passages, depending upon whether a word or a syllable served as the unit of performance in a given distraction situation. At one sitting, the subject performed under the following 15 conditions:

I. Control situation—subject reads naturally with no experimental distraction operating. (500 words.)

II. Subject reads in rhythm with walking—one word per step. (250 words.)

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[1]This study is part of a Ph.D thesis directed by Dr. Wendell Johnson at the State University of Iowa as part of a program of studies in the psychology of stuttering.

[2]This is the second of two studies on the effect of distraction on stuttering. The first, which included an introductory discussion on distractions in general and a survey of the literature, appeared in the December, 1939, issue of the *Journal of Speech Disorders*.

III. Subject reads in rhythm with walking—one syllable per step. (250 syllables.)

IV. Subject reads in rhythm with the tapping of his foot—one word per tap. (250 words.)

V. Subject reads in rhythm with arm swing—one syllable per swing. (250 syllables.)

VI. Subject reads in rhythm with arm swing—one word per swing. (250 words.)

VII. Subject reads in rhythm with hand-wrist swing—one word per swing. (250 words.)

VIII. Control situation—subject reads naturally with no experimental distraction operating. (500 words.)

IX. Subject reads in sing-song rhythm—every other syllable accented. (250 syllables.)

X. Subject reads with accent on every third word. (250 words.)

XI. Subject reads in rhythm with visual stimulation (light flashing rhythmically)—one word per flash. (250 words.)

XII. Subject reads in rhythm with auditory stimulation (metronome at 92 beats per minute)—one word per beat. (250 words.)

XIII. Subject reads in rhythm with auditory stimulation (metronome at 184 beats per minute)—one word per beat. (250 words.)

XIV. Subject reads in rhythm with tactile stimulation (wooden rod touching subject's hand rhythmically)—one word per touch. (250 words.)

XV. Control situation—subject reads with no experimental distraction operating. (500 words.)

Throughout the experiment only the observer and the subject were present. All subjects read in the same laboratory situation and same routine was followed in all cases. Between situations VIII and IX there was an intermission three to five minutes in length.

Although data were secured for 18 subjects, the record for one subject was excluded from the analysis. This procedure seemed justifiable because of the extreme discrepancy between his performance and that of the other subjects, and because his clinical history reveals factors which tend to account for his atypical performance in the conditions of this experiment. (This subject attended a "stuttering school" which required the use of the arm swing on each syllable as the major therapeutic measure. Rigid training in employing that distraction device has apparently resulted in rendering this individual incapable of considering a complete word as a unit.) In the three situations of this experiment which use the syllable as the unit of performance (III, V, and IX), this subject reacted in a manner very similar to that of the other subjects, his

performance being well within the range of the group. However, in all of the remaining distraction situations, the complete word was the unit of performance and this subject consistently exhibited a stuttering frequency strikingly removed from the range of the other subjects. The graph in Fig. 1 indicates the marked discrepancy in performance between this subject and the remaining group.

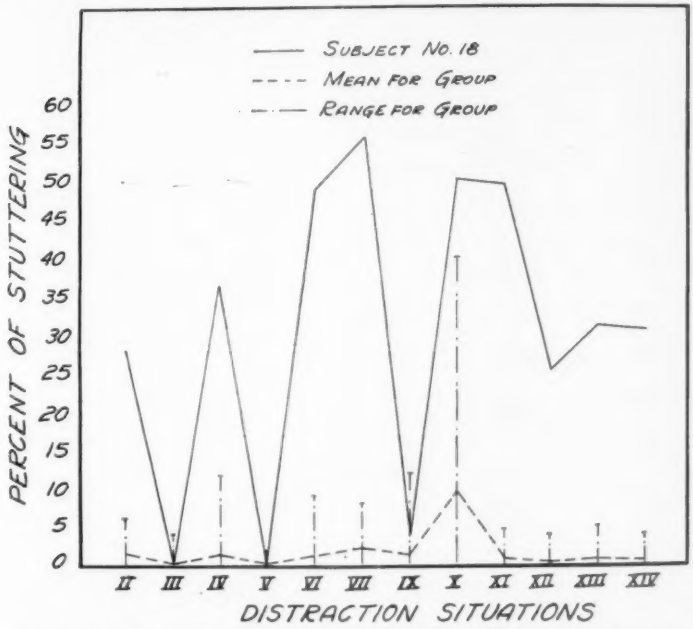

FIG. 1. The Percentage of Stuttered Words for Subject No. 18 in Each Situation Compared with the Mean and Range for the Other 17 Subjects.

Apparatus

The rhythmical visual and tactile stimuli were furnished by connecting, respectively, a light bulb circuit and a movable wooden rod with a phonograph turntable which revolved at a given speed—approximately 90 r. p. m. In the case of the light bulb circuit, there was a brush switch which contacted a plate electrode on the side of the phonograph turntable one time in each revolution, causing the bulb to light up momentarily. In the case of the tactile stimulus, a wooden rod was attached at one end to the turntable and at the center to a clamp on a vertical stand, in such a way that, as the phonograph

TABLE I

THE MEAN AND MEDIAN NUMBER OF STUTTERED WORDS, THE S. D., AND THE RANGE FOR EACH OF THE SITUATIONS FOR ALL 17 SUBJECTS

	Normal	Distraction Situations												Control		
		II	III	IV	V	VI	VII	IX	X	XI	XII	XIII	XIV	I	VIII	XV
A. M.	98.1	5.0	0.8	4.2	0.7	3.6	6.0	3.2	24.5	2.2	0.8	1.9	1.4	121.6	90.0	82.8
Mdn.	78.0	3.0	0.0	0.0	0.0	1.0	3.0	1.0	11.0	0.0	0.0	1.0	0.0	100.0	58.0	51.0
S. D.	66.4	5.7	2.0	8.1	1.5	5.9	6.9	6.8	30.5	3.2	1.9	2.8	2.5	71.5	67.3	67.3
Range	18—	0—	0—	0—	0—	0—	0—	0—	0—	0—	0—	0—	0—	30—	17—	2—
	225	17	8	30	5	22	26	29	100	11	8	11	9	252	208	215

TABLE II

THE MEAN AND MEDIAN PERCENTAGES OF DECREASE FROM THE NORMAL PERCENTAGE OF STUTTERED WORDS, TOGETHER WITH THE S. D., FOR EACH OF THE 12 EXPERIMENTAL SITUATIONS FOR ALL 17 SUBJECTS

	Distraction Situations											
	II	III	IV	V	VI	VII	IX	X	XI	XII	XIII	XIV
A. M.	89.1	98.4	88.6	98.1	92.7	82.4	92.6	52.7	93.1	97.3	95.1	95.8
Mdn.	92.7	100.0	100.0	100.0	99.1	95.3	97.8	58.2	100.0	100.0	98.5	100.0
S. D.	13.1	3.0	25.1	4.9	9.4	30.6	10.7	37.2	11.2	6.7	9.7	7.1

TABLE III

CORRELATIONS OF THE NORMAL NUMBER OF STUTTERED WORDS WITH THE NUMBER IN EACH DISTRACTION SITUATION

	Distraction Situations											
	II	III	IV	V	VI	VII	IX	X	XI	XII	XIII	XIV
r with normal	.45	.38	.17	.21	.47	.15	.42	.69	—.04	—.27	.12	53.

turntable revolved, the free end of the rod moved noiselessly back and forth in a horizontal plane. The subject was seated in a position such that the rod contacted the back of his hand.

It is evident that in the presentation of rhythmic sensory stimuli, incidental rhythmic cues in sense fields other than the one under consideration must be avoided. Accordingly, in the presentation of both the visual and tactile stimulation, all rhythmical auditory cues were eliminated. In the situations using auditory stimuli, the metronome was placed on a table behind the subject so that there would be no rhythmical visual cues from the movement of the pendulum. Likewise, in the situation employing the tactile stimulus, the subject faced away from the apparatus in order to avoid seeing the movement of the rod as it touched his hand periodically.

Reliability

The reliability of the observer, as determined by several methods, has been discussed in Experiment I.[3]

Results

Throughout the discussion of the results, the average of the three control situations will be designated as "normal," the assumption being that the average of a sample of three control readings is probably more nearly an indication of the subject's frequency of stuttering under normal conditions than would be any one of the control situation measures.

The results for situation X (accent on every third word) exhibit a conspicuous deviation from the trend of the remaining distraction situations. Apparently this speech rhythm presented such difficulty of execution that its distractive value was markedly decreased. Several of the subjects reported that they found it very hard to read in this manner, and a few even displayed considerable annoyance in this situation.

Table I summarizes for the total group the basic data regarding the number of blocks for each distraction situation and for the normal, giving the mean and median as measures of central tendency and the range and standard deviation as measures of variability.

The mean and median percentages of decrease from the normal for each distraction situation are indicated in Table II. It will be noted that the percentage of decrease in the incidence of stuttering was very much smaller on situation X than on any other of the distraction situations. Performance in the opposite direction—that is, showing an increase over the normal percentage rather than a decrease—occurred in only four instances out of the 204 tabulations (17 subjects in 12 situations each) in the complete percentage of decrease table.[4] Two of these occurred on situation X.

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[3]See footnote 1, for reference for Experiment I.

[4]The complete percentage of decrease table is included in the appendix of the manuscript copy of this study which is on file in the library of the University of Iowa.

It seemed interesting to determine whether the various subjects tended to occupy the same positions relative to the remainder of the group with respect to the frequency of their stuttering throughout the various situations. That is, does the individual who stutters the greatest number of times in the normal situation tend also to show the highest frequency of stuttering, relative to the group, throughout the experiment—and similarly for the second highest individual, the third highest, etc., down to the one having the smallest number of blocks.? In order to answer this question, correlations were computed for the normal number of blocks of the various individuals as compared with their performance in the several distraction situations. The values of the Pearson *r* that were found are shown in Table III. It is evident from the size of these correlation coefficients that there seemed to be no highly consistent tendency for the individuals to retain the same positions, relative to the group, throughout the experiment. It will be noted that the highest degree of consistency in that respect occurred in situation X. The reason for this is readily apparent when it is recalled that the frequency of stuttering in this situation tended to be extremely high, even exceeding the normal amount of stuttering in two instances. In several cases, the incidence of stuttering in this situation closely approximated the normal performance. For a sample of this size, 17 subjects, an *r* must exceed .48 to be significant at the five per cent level or .61 to be significant at the one per cent level.[5] It is evident from Table III that only one of these correlations (that for situation X) is significant at the one per cent level and only one other (that for situation XIV) meets the requirement for significance at the five per cent level.

When stutterers read orally throughout a considerable period of time, it is interesting to discover whether any adaptation effect is present. That is, as the individual becomes accustomed to reading, does he tend to stutter less frequently than at first? In order to determine whether such an effect was present in the data for this study, percentages of adaptation were computed for the three control situations, comparing I with VIII, VIII with XV, and I with XV. The percentage of adaptation was considered as the per cent of decrease in number of blocks from the earlier to the later situation of each of these pairs. The three percentages were computed for each individual and for the total group. One subject consistently showed an increase rather than a decrease in number of blocks throughout the three control situations, actually stuttering 111 per cent more in situation XV than in situation I. However, there was a consistent adaptive tendency for the rest of the group, there being only four other percentages of increase rather than decrease in the 54 percentages under consideration.[6] The group as a whole showed an adaptation effect

[5]See Table V. A. on p. 212 in the sixth edition (1936) of *Statistical Methods for Research Workers* by R. A. Fisher.

[6]A complete table of the percentages of adaptation is included in the appendix of the manuscript copy of this study which is on file in the library of the University of Iowa.

of 26 per cent from situation I to situation VIII, of eight per cent between situations VIII and XV, and of 32 per cent from situation I to situation XV.[7]

Another representation of the performance of the group in the various distraction situations is seen in Fig. 2 which shows the mean,

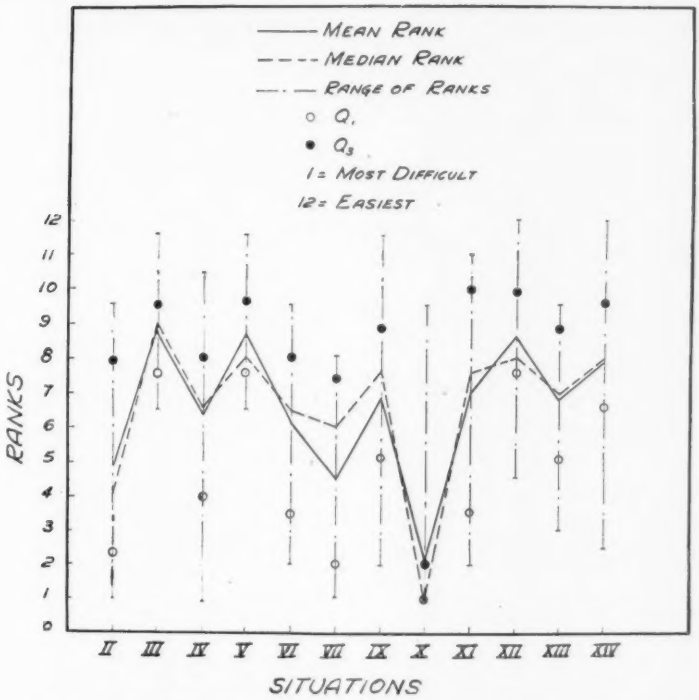

FIG. 2. The Mean, Median, Range, and First and Third Quartiles of the Ranks of Difficulty of the Distraction Situations, in Terms of the Frequency of Stuttering, for all 17 Subjects.

median, range, and the first and third quartiles of the ranks of difficulty. The distraction situations were ranked from "most difficult" (with a rank of 1.0) to "easiest" (with a rank of 12.0) for each subject

[7]This is to be compared with the adaptation figures published by Johnson and Inness (2). They found that for 41 stutterers there was a total adaptation of 48 per cent between the first and fifth readings of the same passage. For a group of 31 stutterers they found that between the first and fifth 180-word segments of a 900-word passage there was a total adaptation of 18.9 per cent.

TABLE IV

THE MEAN PERCENTAGE OF STUTTERED WORDS IN EACH SITUATION FOR ALL 17 SUBJECTS; THE DIFFERENCES AMONG THE MEANS, AND THE t-VALUES FOR THESE DIFFERENCES

	Normal	II	III	IV	V	VI	VII	IX	X	XI	XII	XIII	XIV
Mean %	19.6	2.0	0.3	1.7	0.3	1.5	2.2	1.3	9.8	0.9	0.3	0.8	0.6
Normal		5.68	5.88	5.45	5.85	5.87	5.44	5.94	3.92	5.70	5.68	5.73	5.79
II	17.6		3.40	0.50	0.34	1.00	0.33	1.40	3.25	1.83	3.40	2.67	2.33
III	19.4	1.7		1.86	0.71	2.44	3.80	0.18	3.28	1.47	0.00	2.00	0.80
IV	18.0	0.3	1.3		1.75	0.29	0.86	0.50	2.76	1.33	2.06	1.61	1.59
V	19.3	1.7	0.1	1.4		2.73	3.73	1.72	3.19	1.88	0.00	1.91	1.25
VI	18.2	0.5	1.1	0.2	1.2		1.50	0.50	3.17	0.98	1.96	1.35	1.61
VII	17.4	0.2	1.9	0.6	1.9	0.7		1.27	2.73	2.24	3.39	3.04	3.27
IX	18.4	0.7	0.9	0.4	1.0	0.2	0.9		3.26	0.53	1.35	0.78	1.08
X	9.8	7.8	9.5	8.1	9.5	8.3	7.6	8.5		2.87	3.09	3.05	3.07
XI	18.8	1.1	0.5	0.8	0.6	0.6	1.3	0.4	8.9		2.50	0.37	0.79
XII	19.3	1.7	0.0	1.4	0.0	1.2	1.9	1.0	9.5	0.6		2.78	1.15
XIII	18.9	1.2	0.4	0.9	0.5	0.7	1.4	0.5	9.0	0.1	0.5		0.77
XIV	19.1	1.4	0.2	1.1	0.3	0.9	1.6	0.7	9.2	0.3	0.3	0.2	

t-values required for significance: at the one per cent level, 2.921; at the two per cent level, 2.583; at the five per cent level, 2.120.

in terms of the number of words stuttered in each situation. The curve shows considerable fluctuation with a marked drop on situation X, as would be expected from the comments earlier in the paper concerning the performance in this situation.

In order to determine the relative effectiveness of the several distractions as compared with the normal and with one another, the t-test of significance was employed. The results are summarized in Table IV. The mean percentages for the normal and for the various distraction situations appear in the top row of the table. The percentages indicate the number of words stuttered per hundred words read. In the lower half of the table are shown the differences among those various means, and in the upper right half the t-values for these differences are indicated. The number of degrees of freedom is, in this instance, 16, since there are (n-1) degrees of freedom with such data. The corresponding t-value at the one per cent level is 2.921. There are 27 instances of such t-values in this table out of a total of 78 t-values. The differences between the normal mean percentage and that of each of the 12 distraction situations are statistically significant, all of those t-values being well above 2.921. It will be noted that the differences between the mean of situation X and the mean of the other situations are significant in all except three instances (comparisons with IV, VII, and XI). However, the t-values in these three cases lie above the value required at the two per cent level—2.583. In other words, such differences would occur only twice in 100 times by chance, if there were no real differences. Interpreting the mean differences in the light of their t-values, it appears that, for the group:

(1) All of the distractions were effective in reducing the frequency of stuttering significantly from the normal.

(2) The rhythmic distraction in situation X (accenting every third word) was less effective than any of the other distractions and the differences are statistically significant in all except three instances (IV, VII, and XI), and in these three instances the chances are 98 in 100 that the differences are real.

(3) The hand-wrist swing (situation VII) is significantly less effective than the distractions employed in situations III, V, XII, XIII, and XIV; namely, walking—one syllable read per step, the arm swing on each syllable, the metronome at either speed (92 mm. or 184 mm.), and rhythmical tactile stimulation.

(4) Walking—one word read per step (situation II) is significantly less effective as a distraction than either walking with one syllable per step (situation III) or reading with the metronome at 92 beats per minute (situation XII).

Audience Experiment

In order to determine whether the effectiveness of rhythmic distractions is affected by the presence of an audience, a short auxiliary

study was made. Five subjects, who had participated in the main experiment and for whom the rhythms had served as very effective distractions, read four 250-word passages before a class of university students. The passages read were different from those used in the main experiment but were from comparable material. Each subject performed in the following four situations:

1. Control situation—subject reads with no experimental distraction operating. (250 words).
2. Subject reads in rhythm with arm swing—one word per swing. (250 words).
3. Subject reads in rhythm with metronome (92 beats per minute)—one word per beat. (250 words).
4. Control situation—subject reads with no experimental distraction operating. (250 words).

The arm swing and metronome distractions were chosen as representative of the bodily and sensory rhythms, respectively. As in the main experiment, the metronome was placed behind the subject in order to eliminate visual cues.

A second observer also marked stuttered words throughout the experiment, in order to determine whether there were differences between the performance under the normal condition and in the distraction situations even when a different observer recorded the blocks.

For the arm swing distraction, the experimenter found that the mean per cent of decrease from the normal frequency of stuttering was 89.4, as compared with a mean of 99.8 per cent for the same subjects in the main experiment. For the metronome distraction, the mean decrease was 98.0 per cent, as compared with 100 per cent mean decrease in the main experiment. The data of the second observer showed mean percentages of decrasee of 87.6 and 98.1 for the arm swing and the metronome, respectively.

The significance of the difference in performance was investigated by applying the t-test to the differences in mean percentage of stuttering. Table V summarizes the findings from the data of both the experimenter and the second observer and from the data of the main experiment for these five subjects, for the distractions under consideration. Roman numerals VI and XII refer to the situations in the main experiment which correspond to situations II and III, respectively, in this auxiliary study. The mean percentages appear in the top row of the table, while the various mean differences, together with their corresponding t-values (in parentheses below the differences), are shown in the lower part of the table. It will be noted that both the arm swing and the metronome served to reduce significantly the frequency of stuttering, as compared with the normal. The differences in performance between each of these distractions and the normal, as computed from the data recorded by

either the experimenter or the second observer, had corresponding t-values which were considerably above the value required in this case for significance at the one per cent level. The differences in performance between the main experiment and the audience experiment were not significant in the case of either distraction. With respect to their relative effectiveness, there was no significant difference between the two distractions, either in the main experiment or in the audience situation.

TABLE V

THE MEAN PERCENTAGE OF STUTTERED WORDS IN EACH SITUATION BEFORE AN AUDIENCE AND IN EACH OF THE CORRESPONDING SITUATIONS IN THE MAIN EXPERIMENT FOR FIVE SUBJECTS AND FOR EACH OF TWO OBSERVERS; AND t-VALUES FOR THE DIFFERENCES BETWEEN COMPARED SITUATIONS

	Audience Experiment						Main Experiment	
	Experimenter			Second Observer				
	Normal	II	III	Normal	II	III	VI*	XII*
Mean %	38.9	5.2	1.1	38.2	5.9	1.0	0.1	0.0
Normal		33.7 (6.06)	37.8 (5.65)		32.3 (6.05)	37.2 (5.62)		
II			4.1 (1.62)			4.9 (1.70)	5.1 (1.75)	
III								1.1 (1.08)
VI*								0.1 (0.12)

t-values required for significance: at the one per cent level, 4.604; at the two per cent level, 3.747; at the five per cent level, 2.776.

*Situation VI in the Main Experiment corresponds to Situation II in the Audience Experiment; likewise, Situation XII corresponds to Situation III.

From these findings it appears that the presence of an audience does not significantly reduce the effectiveness of rhythmic distractions.

Summary and Conclusions

The purpose of the study was to investigate the effect of rhythm as a distraction in stuttering. Each of 17 subjects read under 15 conditions including three control situations and 12 distraction situations which involved synchronizing the oral reading with: (1) bodily rhythms (walking, tapping the foot, arm swing, and hand-wrist swing), (2) speech rhythms (sing-song inflection and accent on every third word), and (3) rhythmic sensory stimulation (visual, auditory, and tactile). Since the experimenter was the only observer during these readings, a short auxiliary study was made to determine whether certain of the distractions would operate as effectively in an audience situation as when only the experimenter was present.

The results of this study show that all of the rhythms investigated acted as effective distractions. This points to the conclusion that imposed rhythms in general, whether they be rhythmic bodily activities, speech rhythms, or sensory rhythms, serve to significantly reduce frequency of stuttering. It appears from the results that, of these, rhythmic sensory stimuli are the most effective as distractions. However, it should be recalled that the sensory rhythms were used in the last four of the distraction situations and that the effect, at least relative to the earlier part of the series, might be due in part to adaptation.[8] The speech rhythm involving an accent on every third word tended to be significantly less effective than any of the other rhythmic distractions.

In this study, as in the chorus reading study,[8] the results on performance with distraction are eloquent proof of the fact that stuttering is not basically a phonetic difficulty. All of the passages read in the experiment were edited for difficulty so that, from a phonetic standpoint, there was no more basis for high frequency of stuttering on the control passages than on those read in the distraction situations. The wide discrepancy in performance must, therefore, be explained on some other basis.

The possibility of attributing the effectiveness of all of the distractions to the mere slowing down of the rate is ruled out by the results obtained with the metronome at high speed. The difference in frequency of stuttering associated with the high and low speeds of the metronome tended to be significantly in favor of the low speed, but there was significantly less stuttering associated with the metronome at high speed than occurred during the normal reading. Also, when the situation involving the metronome at high speed is compared with the other distraction situations, it is found that there was significantly more stuttering associated with the accenting of every third word, and with reading in rhythm with the hand-wrist swing, and that there is likewise a tendency for the frequency of stuttering associated with the metronome at high speed to be significantly less than that associated with walking with one word read per step. Comparison with all other distraction situations shows no significant differences.

The social or situational factor was kept constant throughout the 15 readings. Therefore, it would not seem justifiable to attribute the results to any such factors. This is all the more apparent when the results of the auxiliary audience experiment are considered, from which it appears that the effectiveness of apparently typical distractions is not significantly reduced by the presence of an audience.

General Summary and Conclusions

Two studies were made on the effect of certain distractions on frequency of stuttering. The first[9] was an investigation of chorus

[8] See footnote 1 for reference.

[9] See footnote 1.

reading, in which each of 18 subjects read 14 different 500-word passages under conditions including two control and 12 distraction situations. An effort was made to arrange a series of situations in which there was a gradation of the factors involved in chorus reading, in order to ascertain which factor or combination of factors is crucial in determining its effectiveness as a distraction. In the second study (the one reported in the present article), which concerned the effect of various rhythms as distractions in stuttering, each of 17 subjects read 15 different passages under conditions including three control situations and 12 distraction situations which involved synchronizing the oral reading with: (1) bodily rhythms (walking, tapping the foot, arm swing, and hand-wrist swing), (2) speech rhythms (sing-song inflection and accent on every third word), and (3) rhythmic sensory stimulation (visual, auditory, and tactile). A short auxiliary study was made to determine whether the presence of an audience affects the operation of rhythmic distractions.

The findings of these two investigations offer conclusive evidence that stuttering is not basically a phonetic difficulty, since under certain conditions the subjects were able to read very fluently. This indicates that there is no basis for the notion that stuttering is due to an inability to produce certain sounds.

The results of the chorus reading study show that the stutterer tends to speak most fluently when his performance is not easily differentiated from the total activity at the moment. It seems likely that as long as he knows that the whole activity will go on, he does not place so high an evaluation on his part in it—and, in consequence, tends to perform more efficiently. It would appear that the more conspicuous his performance is, the more he feels impelled to speak well since his inadequacy would then be noticeable. It seems that the more important it is for him to speak well, the more likely he is to stutter.

Imposed rhythms in general seem to serve as effective distractions. All of those employed in the rhythms study significantly reduced the frequency of stuttering. It should be noted that chorus reading should also be considered as an imposed rhythm. Findings from the rhythms study indicate that the effectiveness of these imposed rhythms cannot be attributed merely to the slowing down of the rate of performance.

A real understanding of the mechanism of distraction would probably lead to the discovery of the basic nature of stuttering itself, for if we could isolate and understand the operation of the factors which alleviate the difficulty, it is at least highly probable that most revealing clues to the fundamental etiology of the disturbance would follow.

Certain further lines of investigation may be suggested. A study of the effect on frequency of stuttering of one or more distractions over an extended period and in a variety of speech situations should indicate the extent of the therapeutic significance of such measures, and should also indicate the nature of the conditions under which the distractions are more and less effective. Another type of investi-

gation that might be revealing would involve the study of various neuro-physiological phenomena in relation to stutterers' reading and speaking under specified distracting conditions. In this connection electroencephalographic studies might be suggested, as well as studies of breathing and of muscle action currents. In the present study it was found that there was a tendency for the distractions used in the rhythms study to be more effective when synchronized with the speaking of syllables than when synchronized with the speaking of words. The least effective distraction involved patterning in terms of accenting every third word; this distraction was significantly less effective than any of the others that were used. These findings suggest a study of the relative effectiveness of specified distractions applied to varying magnitudes of units of speech production, such as syllables, words, groups of words, etc.

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(2) **Johnson, W.**, and **Inness, M.** A statistical analysis of the adaptation and consistency effects in relation to stuttering. *Journal of Speech Disorders*, March, 1939, 79–86.

NEWS AND NOTES—(*Continued from page 24*)

Vienna, Auguste Jellinek. She has also published widely enough so that her name is well known abroad. She is particularly recognized for her aptitude in dealing with the little deaf child. Your editor of this journal is responsible for carrying through the moves which led to the bringing of both to America, and naturally invites them to make free use of its pages for publication, especially of their objective research and experiments. One article from Dr. Froeschels has already appeared.

Dr. Ralph Sokolowsky has just joined the staff of Capital University in Columbus, Ohio. Its president Dr. Mees, and the head of its Speech Department, Prof. Craig are to be congratulated. For Dr. Sokolowsky was known from one end of Germany to the other as one of the most outstanding Speech Pathologists that country had ever known. Germany's loss is America's gain. In the field of Speech Pathology Capital University thus takes a clear lead in the state of Ohio. For no other university in that state can boast of such strength in Speech Pathology. It had long had a strong offering in minor Speech Correction, under the direction of Prof. Craig. And last Fall it had added Prof. Garber Drushal, former Clinician at the Children's Hospital in Columbus, and at the time on the staff of the University of Missouri. Prof. Drushal's unusual personality and fine scholarly ability, was therefore already well known in Columbus. At the Children's Hospital, he had won the respect of all for the fine ability he had shown in dealing with various types of Minor Speech Correction disorders. With the addition now, of Dr. Sokolowsky to deal with Major Speech Pathology cases, Capital University has a staff in the field as a whole, the like of which few Universities in America can boast. He was closely associated in publication with our co-editor, Dr. M. Nadoleczny, of the University of München, and with Dr. H. Gutzmann of the University of Berlin. He has the advantage of outstanding recognition which has come to him for a wide range of studies in the field of Speech Pathology. His work with stutterers has been unusually fine. But that with voice disorders of all kinds brought him patients from all over the world. Among those was our well known Metropolitan Opera star, Julia Culp. The

(*Continued on page 64*)

THE SURGICAL TREATMENT OF STAMMERING

1840 — 1842

GRAY BURDIN
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Of all the theories of causation and methods of treatment of stammering, none has been more interesting than that of the surgical "cure."

No medical investigation is complete without reference to the opinions of Galen and Celsus, each of whom made observations concerning stammering which are more curious than valuable. Galen, in 166 A. D., ascribed the entire blame to various abnormalities of the tongue,[1] for which he suggested cauterization and the cutting of the nerves to the afflicted part.[2] This seems to follow closely the theory laid down by Celsus in 19 A. D.[3, 4] However, neither of these physicians seem to have operated, confining their efforts solely to the realm of speculation. It was not until 1608 that Fabricius Hildanus operated on his brother for stammering by cutting the frenum.[5, 6] Undoubtedly, there were others who attempted surgical cure, but the literature for the next two hundred twenty-five years contains little or nothing in this particular field.

The early part of the nineteenth saw a rapid development in surgical skill. Spurred on by the work of the anatomists, physicians saw in surgery the possible cure to almost any defect in which was found mal-functioning of the parts.

> Insulated attempts were indeed made by Thilenius, Sartotius, Michaelis, Delpech, etc., to cure deformities in adults . . . deformities of the limbs and even of the trunk, which but a few years previous would have been considered as entirely incurable . . . were daily treated with success. And there were comparatively few distortions of the human frame, even when existing at an advanced period of life, which could be regarded

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[1]Potter, Samuel O. L., *Speech and Its Defects*. Philadelphia: P. Blakiston, Son & Co., p. 41.

[2]Payne, Joseph F., *Harvey and Galen*. Oxford Press, 1897, p. 46.

[3]Potter, S. O. L., *Loc. cit.*, p. 42.

[4]Makuen, G. H., "A Brief History of the Treatment of Stammering," *Medical Record*, 1909, pp. 1015–1017.

[5]Potter, Samuel O. L., *Op. Cit.*, p. 43.

[6]Liston, Robert, *Operations of Surgery*. Philadelphia: 1846, pp. 500–501.

> as beyond the reach of surgical aid. The division of the muscles of the eye for the cure of squinting was first suggested by Anthony White of London . . . but it was not carried into execution on the living human subject until the 26th of October, 1839 [?] when the Operation was successfully performed by Dieffenbach of Berlin.[7]

Dieffenbach, who was a Professor in the Medical School at the University of Berlin and the outstanding physician-surgeon of his day, had discovered several years previously "Operations on face muscles, particularly cheek (squinting) muscles, and by loss of their natural anatagonists, healthy muscles are wont to become firm and contracted."[8] Proceeding on this assumption, he treated strabismus by severing the tendons of the eye muscles. This success led him to attempt the procedure of subcutaneous division of the lingual muscles as a treatment of stammering.[9] Dieffenbach himself states:

> The idea suggested itself to me . . . that an incision carried completely through the root of the tongue might be useful in stuttering which had resisted other means of cure, by producing an alteration in the condition of nervous influence, allaying the spasms of the chordae vocales.[10]

Back of this operation for stammering, however, lies an explanation:

> What suggested the idea to him was the circumstance of a person who squinted with both eyes, and who happened also to be affected with stammering, coming to his consultation to have an operation performed on *her* [italics mine] eyes. He has subsequently observed these two defects are often coexistent in the same person.[11]

We would assume from this, therefore, that Dieffenbach did not operate on this patient for stammering, rather for strabismus, if at all. The exact date of this observation by Dieffenbach is not known, but the idea was growing by leaps and bounds in his own thinking:

> As I believed that the cause of stammering was dynamic, and consisted in a spasmodic state of the air-passages, and more especially of the glottis, communicating itself to the muscles of the tongue and of the face and neck, I inferred that, by interrupting the innervation to the muscles involved in this abnormal condition, we might succeed in modifying or even completely

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[7]Post, Alfred C., *Observations on the Cure of Strabismus and the New Operation for the Cure of Stammering.* New York: Chas. C. Francis Co., 1841, p. 55.

[8]Liston, Robert, *Loc. Cit.*

[9]Garrison, *History of Medicine*, p. 495.

[10]Dieffenbach, J. F., *Memoir on the Radical Cure of Stuttering by Surgical Operation*, as reviewed in *Lancet*, II (1840–1841), p. 21.

[11]*Gazette Medicale*, 13 Mars, 1841, as quoted in *Medico-Chirurgical Review*, New York, XXXV, n. s. (1841), July 1, p. 207.

> suspending it. The obvious way of doing this was to make a transverse section of the tongue.[12]

It is known that he had three different modes of operating: Cutting the transverse horizontal section of the root of the tongue, cutting the subcutaneous section of the root of the tongue with the conservation of the mucous membrane, and cutting the horizontal section of the root of the tongue with excision of a triangular piece of its substance.[13] But whether these types were the result of experimental operations or of forethought is not known.

Dieffenbach performed his first operation in January, 1841. While there seems to be some doubt as to exact date, some writers contending it was the 26th,[14] the evidence seems to point to the 7th.[15, 16, 17]

In a letter written from Berlin on January 29th, 1841, Dieffenbach settles the argument:

> Um lastigen Prioritats-Streitigkeiten uberhoben zu sein, zeige ich meinen Herren Collegen heirmit an dass ich meine Operation des Stotterns zuerst am 7. Januar 1841 bei einem 13 jahr Doenau vollzogen u. den vollkommen Geheilten der Hufeland'schen med. Gesellschaft in der Sitzung vom 22. Januar vorzustellen die Ehre habe.[18]

In this first operation, Dieffenbach chose to remove a wedge-shaped portion of the posterior part of the tongue for "I felt more confidence in this than in other methods."[19]

Undoubtedly, the 13 year old boy was no more frightened than was Dieffenbach excited and curious as to the outcome of this, his first operation for stammering. He furnishes us with a vivid picture of his surgery:

> The patient was seated in a high chair opposite the window; his head being held perpendicular by one assistant, who at the same time drew the angle of the mouth backwards by means of retractors. His tongue being thrust forward was seized by a pair of strong forceps, (furnished with teeth to prevent their slipping) which I gave to another assistant to hold. By these means the tongue was steadied and compressed transversely. Having seized the tongue posteriorly to the forceps, with the

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[12] *Ibid.*

[13] *Ibid.*

[14] Post, Alfred C., *Op. Cit.*, p. 55.

[15] Appelt, Alfred, *Stammering and its Permanent Cure.* New York: Dutton and Co., p. 27.

[16] *Medico-Chirurgical Review, Loc. Cit.*

[17] Dieffenbach, J. F., *Op. Cit.*, p. 22.

[18] *Jahrbücher der in-und Ausländischen Gesammten Medicin.* Leipsic: Carl Schmidt, XXX (1841), p. 229.

[19] Dieffenbach, J. F., *Loc. Cit.*

> thumb and forefinger of my left hand I compressed it transversely and at the same time elevated it; then passing a long, curved, pointed bisoutry from the left side beneath the tongue and at the posterior half, until I felt the point at the right side with my forefinger, I cut directly upwards, dividing the tongue right through. I now grasped the tongue in front of the wound with a pair of long forceps, armed at the point with teeth, pressed it firmly together, and with a small, straight scalpel, made a section from above downwards, commencing on the dorsum linguae about half an inch anteriorly to the division already made, and meeting it anteriorly; by these two sections a piece the shape of a wedge was now cut out of the tongue at its posterior half. The wound was now united by six ligatures of thick silk, which were passed in such a manner as to encircle in depth and breadth a considerable portion beyond the margin of the wound, and were forcibly drawn together in order to restrain the hemorrhage. The patient became rather faint toward the termination of the operation, and afterwards vomited large quantities of blood he had swallowed. As soon as we had washed his mouth out with water, I was exceedingly pleased to hear him pronounce words which, previous to the operation, he was unable to articulate.
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> . . . . . .
>
> Perhaps it may be well to state that the muscles divided in this operation are the lingualis, genio-hyo-glossi, the hyo-glossi, and the stylo-glossi.
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> I think previous to this operation, we ought to consider whether the nervous system of the patient is sufficiently strong enough to stand so severe a shock or be . . . able to bear so considerable a hemorrhage as that which here is inevitable; and it would be wise to ascertain that the heart and large blood vessels are in a healthy state.[20]

Dieffenbach's surgical technique varied slightly with each of the three types of operations.

> In performing these operations, the tongue was seized with forceps terminating in double hooks to each blade (pinces de Musceaux) and drawn out of the mouth. A bisoutry is then passed through it from behind forwards three short, curved needles armed with ligatures, which are carried to the bottom of the wound, and brought them out on the upper surface of the anterior portion where they are tied together and approximate the cut surface. This first operation was performed in only four cases. The second operation is performed in a similar manner, with the exception that the mucous membrane of the dorsum of the tongue is not cut through. In the third, a piece of the tongue is cut through, somewhat resembling in shape a slice of melon, and the ligatures applied as in the first method. This last

[20] *Retrospect of Practical Medicine and Surgery*, III (1841), pp. 75–76.

operation has entirely superseded the others, which were only performed at the outset.[21]

That the operation was painful may well be imagined, since Nitrous Oxide and Chloroform were not discovered until 1844,[22] and Ether was first used in 1843.[23]

Dieffenbach, however, believing himself the discoverer of a new and revolutionary operation, immediately wrote a pamphlet-like letter to the Institut de France entitled ***Memoir of the Radical Cure of Stuttering by Surgical Operation*** in which he described in some detail his technique of operating. On January 31, 1841, he posted it in Berlin. It was not received and made public until February 13.[24]

The first actual news of the Dieffenbach treatment, however, reached France on February 4th, 1841. Long and laudatory articles appeared in newspapers and professional circles in Paris were immediately beset with sufferers desiring treatment. Needless to say, the surgeons responded to this demand. Almost every surgeon of repute attempted at one time or another surgical operations on stammerers. On February 6th, Phillips, a Belgian practicing in Paris and a former pupil of Dieffenbach, performed two operations.

> The patient seated on a chair, his head resting against the breast of an assistant, the operator seized the frenum with a small hook near its angle of reflexion with the tongue. Another hook is inserted a little lower down, and incision with scissors made between the two, and the membrane divided to some extent on either side; a sharp pointed bisoutry is then introduced and carried from one side of the symphysis of the jaw to the other. The bleeding is sometime profuse, but is salutary. A piece of sponge dipped in vinegar is placed in the wound to arrest the bleeding.[25]

On the 16th of the same month Phillips reported on his operations[26] to the Medical Academy in Paris. At the same meeting another paper was read cautioning several members of the Academy against acting rashly and without more intimate knowledge of the matter[27] since the only communications from Dieffenbach relative to his operative technique thus far received were articles appearing in the Paris newspapers. However, the stone had started rolling and could not easily be stopped. On March 8th, Dieffenbach was report-

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[21]Lee, Edwin, *Stammering and Squinting and the Methods for their Removal.* London: John Churchill Co., 1841, p. 39.

[22]Dennis, Fred S., "History and Development of Surgery in the Past Century," *Congress of Arts and Sciences*, VI (1906), p. 313.

[23]*History of Medicine.* Philadelphia: Saunders Co., 1929, p. 505.

[24]*London Medical Gazette*, 1840–41, p. 921.

[25]*London Medical Gazette*, II (May 21, 1841), p. 387.

[26]Appelt, Alfred, *Op. Cit.*, p. 27.

[27]*Ibid.*, p. 29.

ing via his *Memoirs* to the Institute de France on 19 such operations performed during January.[28]

While Phillips is generally credited with performing the first French private operation for the division of the genio-glossi muscles, Velpeau first operated in public on February 14th.[29] Preceding both these surgeons, however, were the efforts of Amussat who

> directed his attention to the subject (before the notice of Dieffenbach's operation had arrived) in consequence of a patient stammering who presented himself to have the operation for squinting performed (which was likewise the case with Professor Dieffenbach). (He) subsequently performed the operation on several patients, some of whom were presented to the Academie de Medicine.[30]

Unfortunately, the exact date of Amussat's first operation is not known. But it is known that he followed two types of operations:

> First, he separates with a bisoutry the frenum linguae from its attachment to the lower jaw, and divides the fibro-cellular membrane beneath it. In a few cases, he has found this part of the operation to be of itself sufficient to restore a freedom of speech.
>
> Second, he divides the genio-hyo-glossi muscles at their origin from the lower jaw.[31]

"At the point," says M. Amussat, "where I practice the section of the genio-glossi muscles, there is less difficulty and danger than at any other."[32] On April 19th, 1841, Amussat reported to the Academie de Medicine that he operated on 75 patients,[33] and by the end of the month 84 patients had been operated upon. Amussat had some troublesome cases of hemorrhage, which he generally arrested by the free use of ice, sometimes by introducing compresses of lint and exerting pressure upon them with two fingers of each hand placed in the mouth while the thumbs were applied below the chin. If these means failed, as was frequently the case, he recommended the use of styptics and cauteries.[34]

On April 29th Amussat had operated on a patient, severing the genio-hyo-glossi muscles. On May 17th the patient died.[35]

But French enthusiasm continued. Nearly 200 stammerers alone submitted to this operation within the year. Untold hundreds of cases in the provinces doubtlessly were not reported.

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[28] *Ibid.*, p. 30.
[29] Lee, Edwin, *Op. Cit.*, p. 54.
[30] *Ibid.*, p. 55.
[31] Post, Alfred C., *Op. Cit.*, pp. 57–8.
[32] *London Medical Gazette*, II (May 21, 1841), p. 386.
[33] *Ibid.*
[34] *Ibid.*
[35] *Ibid.*, p. 30.

Shortly before Amussat's loss of a patient, Guersant had raised the first cry of warning in the *Gazette Francais.* He noted the results of the operations as a matter of conscientious investigation. After several operations of his own, following the technique of Dieffenbach's third type, he came to the conclusion that the advantages of surgical interference were doubtful and uncertain, and at the best brought about an improvement in the more fortunate cases only. He further contended that even life itself was seriously endangered and had been known to have been sacrificed altogether.

Velpeau, however, believing himself the first of the French operators, was ingenious enough to invent his own technique rather than follow Dieffenbach's procedure or in any way recognize the efforts of Amussat.

> Velpeau divided the genio-hyo-glossi sometimes with a narrow bisoutry through a puncture of the mucous membrane and sometimes with scissors, dividing the mucous membrane extensively. In one case, in which the tongue was of extraordinary length, he cut out a triangular portion of its anterior part and brought the sides of the wound together with sutures.[36]

Again:

> An operation of a different kind was performed by M. Velpeau. . . . A small triangular portion was cut out of the apex of the tongue without dividing the mucous membrane beneath. The edges of the wound were brought together with points of suture. . . . Another method, the operator drew the tongue out of the mouth with his left hand, furnished with a piece of linen rag, and with the right hand passed transversely through its substance, at the junction of the posterior and middle thirds, a needle armed with four ligatures. Two of the ligatures were tied back as far as possible; the other two were tied anteriorly, thus circumscribing a portion of the tongue, which, after it had sloughed away, would entail a similar loss of substance as in Dieffenbach's operation.[37]

Valpeau later repudiated altogether this and other surgical operations for stammering since many such operations clearly demonstrated that "the sectioning of this or that muscle cannot cure stammering,"[38] following the precedent set by Guersant.

Meanwhile, back in Berlin, Dieffenbach had repeatedly warned over-zealous physicians and surgeons to proceed cautiously. By the middle of April, Berlin surgeons had operated upon 60 patients but with diminishing enthusiasm.[39] They were examining certain facts, which for the time had been overlooked. As a matter of fact,

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[36] *New York Medical Gazette*, I (July 14, 1841), p. 10.

[37] Lee, Edwin, *Loc. Cit.*, pp. 46–7.

[38] *Archiv. General de Medicin.* X. Series 3, March, 1841, p. 359.

[39] Appelt, Alfred, *Op. Cit.*

Dieffenbach's method claimed its first victim within a short time: a young medical student paid with his life for trust in the surgeon's knife as a means of relief from his impediment. This served to dampen the ardour of many German and French operators—this and the fact that Dieffenbach repeatedly urged caution.

Nevertheless, Dieffenbach actually believed in the permanency and value of his contribution.

> Amidst the prevailing rage for modifying operations, I foresee that my having described the three principle available methods, cannot fail to open to surgeons a vast field for the discovery of modifications, and the creation of instruments. We shall have conical and oblique incisions, from the surface and under the skin! Actual and potential cautry! We shall have knives and scissors with improved curves, and a thousand variously fashioned forceps and hooks. They will set the blades at angles with the handles to allow better light falling into the mouth. Opportunity is likewise afforded to professional antiquarians to hunt after a name for this operation. To them I freely make over the right of baptism.[40]

However, in France Baudens' operations were commanding attention. He, too, devised his own operative technique:

> An assistant stands behind the patient and holds his head slightly thrown back, with his mouth widely opened, and the two little fingers drawing back the lips. The surgeon with his left hand holds a sharp hook which he inserts into the frenum linguae near the insertion of the genio-hyo-glossi, which he thus puts on the stretch. He then plunges the points of a sharp pair of scissors on each side of the origin of the muscles to the depth of about an inch, and by closing the scissors divides the muscles. If any fibers remain undivided, he cuts them with a probe-pointed bisoutry.[41]

That Baudens was versatile is shown by the ease with which he attempted to apparently quell violent throat and neck spasms in the stammerer:

> M. Baudens plunges a pair of finely pointed scissors, curved almost to an acute angle, with their blades moderately separated, beneath the tongue, immediately behind the symphysis of the jaw, and with one cut divides the attachment of the genio-glossi muscles. There is generally little bleeding as the incision is close to the bone. A piece of sponge soaked in vinegar is put into the wound and retained for two or three days, which practice has, in some cases, given rise to inflammation and suppuration. Mr. Baudens likewise divides the genio-hyoidei in

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[40]Dieffenbach, J. F., *Op. Cit.*

[41]*New York Medical Gazette*, I (July 14, 1841), p. 10.

those cases where the muscles of the neck and throat are implicated in the spasmodic action.[42]

Bonnet of Lyons likewise developed his own technique of subcutaneous division of the musculature.

> A puncture is made in the skin a few lines behind the symphysis of the jaw; a blunt pointed tenetome is then introduced with its sharp edge to the bone, and passed through upwards till its point is felt by the finger through the mucuos membrane beneath the tongue. The attachments of the muscles are then divided right and left, the cutting edge of the tenetome being kept close to the bone, and acting only on the superior part of its concavity, the genio-glossi alone are cut, and the genio-hyoidei avoided.[43]

Of all the French surgeons outside Paris operating for stammering, Bonnet undoubtedly was the most renowned. While the initial enthusiasm for the surgical cure had subsided somewhat in Paris medical circles, the wave of operations flourished in the more remote sections of the country. Roux, Jobert, Monod, Colombat, Bonnet, Petrequin, Dufresse and others continued to operate.[44]

Many of these surgeons operated under the supposition that all stammerers without exception would benefit from surgery. As will be noted, each operator devised his own method or methods of cutting various muscles, and upon this operation perhaps hoped to build or enhance his professional standing. The literature seems to indicate that there were almost as many different types of operations as there were surgeons performing them.

On the same day that Dieffenbach reported to the Institute de France, March 8th, 1841, James Yearsley, an English physician of some prominence, wrote the following letter to the Editor of the *Lancet*:

> In the practice of my department . . . I have discovered that a large number of my patients suffering from deafness are afflicted with enlargement of the tonsils or uvula. . . . In December last it occurred to me to operate in this manner, (removal of the tonsils and uvula) on two patients. They were at the time of treatment deaf.
> . . . I was unaware of any impediment of speech . . . so afterwards, however, as the cure for deafness advanced, I learned from the parents that both children had been stammerers from infancy, and as much to my surprise as gratification that the cure of stammering had immediately taken place on the excision of the tonsils. . . . I have performed the operation by means of scissors, scalpel, and tenaculum, without serious hemorrhage

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[42] *London Medical Gazette, Op. Cit.*, p. 386.
[43] *Ibid.*, p. 360.
[44] *Jahrbücher, Op. Cit.*, XXXII, p. 83.

> and with small pain . . . In reflecting upon the subject, the explanation I have at present to offer is, that to produce stammering, the dorsum linguae, the palatine arches, velum pendulum palati and uvula approximate so closely together as to leave no room for the expulsion of air from the larynx. . . . You will see that the principle of my operation is widely different from that ascribed to Professor Dieffenbach; and since practiced in France by M. Amussat and Phillips and in this country by Mr. Bennett Lucas.[45]

Immediately following this letter, appears this pointed editorial comment:

> We must confess ourselves somewhat at a loss to comprehend wherein Mr. Yearsley's discovery consists. The removal of enlarged tonsils, which by their bulk occlude the opening of the Eustachian tubes, in order to relieve deafness, is as old as the hills, and daily operations are a very trifling moment in the hands of every surgeon. To snip off the uvula is still more insignificant. To discover after this trifling operation, stammering (of what kind the author does not say) in one or two cases has been cured . . . must be very gratifying. . . . The great Dieffenbach, according to the innocent prattlings of a self-appointed eulogist, cuts across a man's tongue for the purpose of dividing its nerves, "of producing an alternation of the nervous influence," forsooth, pooh, pooh.[46]

There seems to be good reason to believe that Yearsley was among the first of the surgeons to operate for stammering. Evidence indicates that his first operation preceded that of the great Dieffenbach by at least one month and possibly more. Two factors, however, kept, as in the case of Amussat, his discovery relatively unknown: he did not publish his findings immediately in a reputable organ; he was not the great surgeon as was Dieffenbach. But, as was the case with most physicians and surgeons of that day, Yearsley had delved into several fields of medical interest. For a time, he was the exponent of a new method of excising tonsils. He then took up medical journalism, forsaking this for experiments with the deaf and hard-of-hearing. If the facts were known, he probably could have been among the "first" in many fields. One is led to suspect that Yearsley had evidenced a passing interest in stammering only to resurrect his operative technique on the stammerer when the Dieffenbach "cure" became prominent. His obvious love for publicity undoubtedly had much to do with his belated claims.

As is evidenced by the above editorial comment, Yearsley was subjected to much criticism from the beginning. The literature indicates that he had to fight and fight hard to keep what little glory

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[45] *Lancet*, I (1840–41), p. 884–5.

[46] *Ibid.*

there was attached to the new operative technique. On March 20, 1841, he was invited to read a paper before the Westminster Medical Society, of which he was not a member, wherein he stated:

> My attention became directed to stammering during the course of an extensive practice in diseases of the ear. Within the last few years thousands of patients suffering from deafness passed under my treatment. In every case it has been a practice with me to examine minutely the mouth and throat . . . and . . . I discovered frequently a diseased condition of the mucous membrane, with more or less enlargement of the uvula and tonsils. When deafness, accompanied by morbid alterations in the throat, has proved intractable, it was my custom to excise portions of the uvula and tonsils if either presented increase of size . . . In such patients I have frequently found, added to the deafness, a certain degree of thickened speech, the voice being muffled, and rapid utterance impeded. . . . I performed my first operation specially for the improvement of the voice in July, 1840. (P. 7.).
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> . . . . . .
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> Early in December, two patients were under treatment for deafness . . . and in both cases I removed increased growths from their throats with the effect of improving the hearing; and it could not but make a deep impression on me to learn shortly afterwards that not only had the ear affection diminished, but that both were entirely freed from stammering. (P. 8).
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> . . . . . .
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> Of nearly 200 persons affected with stammering who have passed under my notice . . . a large majority presented enlargement of the uvula and tonsils . . . and a great proportion of stammerers are short-breathed. (P. 9).
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> . . . . . .
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> It has appeared to me, that in the great majority of stammerers, the *Isthmus Faucium* has been of much less size than in natural conditions. (P. 17).
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> . . . . . .
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> I must confess I was somewhat taken by surprise when the Memoir of Professor Dieffenbach appeared. I had been aware of my principal facts for two months previously and was silently endeavoring to bring the subject to maturity. Professor Dieffenbach states that he performed his first operation upon the tongue January 7th, 1841; while I had performed mine upon the throat as early as December 5th, 1840. (P. 25).[47]

In Yearsley's own thinking, stammering was produced by a "narrowing of the throat or preventing the free egress of air."[48] The

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[47]Yearsley, James, *Stammering and Other Imperfections of Speech Treated by Surgical Operations on the Throat.* London, 1841 (Pamphlet).

[48]Lee, Edwin, *Op. Cit.*, p. 62.

obvious remedy, therefore, was to remove the uvula entirely, chiefly in view of throwing both the arches of the palate into one. When the tonsils were enlarged as to project beyond the columns of the fauces, the uvula was partially removed and also as much of the tonsil as projected. "In only one case had anything like a severe hemorrhage took place, and in this the bleeding continued for four hours."[49]

As to Yearsley's technique, little is known. "I have performed the operation by means of a scalpel, tenaculum, and scissors, without any serious hemorrhage and with small amount of pain."[50] In view of the potential danger of the French and German operations, one must admit that Yearsley's surgery seemingly was safer.

By the end of March, 1841, Yearsley's pamphlet enjoyed wide distribution at his own expense among the British medical profession. But the physicians and surgeons as a whole rejected the idea. Long and condemning letters were written to the *Lancet* as the foremost medical publication of its day. Many medical associations passed resolutions against the operation. The *Lancet*, as the professional mouthpiece, seemed to take issue with Yearsley in his claims, yet in all fairness to the man, published the following article submitted by him in an effort to stem the objections to his operation.

Of three hundred operations performed between December 5, 1840, and April 30, 1841, the results are thus classified:

> In 63 the relief was immediate, complete and permanent.
>
> In 92 cases relief was immediate and more or less complete . . . and cases may be considered as much relieved.
>
> In 80 no good was apparent at the time of operation . . . educational treatment relieved them more.
>
> In 65 no benefit whatever from the operation or subsequent treatment.
>
> Lastly, in no case have I been able to trace any inconvenience from the operation.[51]

Appearing with this letter from Yearsley are letters purporting to have been received by him from grateful patients lauding his operations. Appearing in an adjoining column are letters addressed to "J. Poett," [Editor of the *Lancet?*] from the same patients condemning the operation as worthless [pp. 591–594]. One unhappy fellow reports: "Mr. Yearsley charged me 10 Guineas [$56.10] for cutting off my uvula . . . which I refuse to pay since I am no better!"

But Yearsley had a few qualified followers. One Dr. Whit says:

> I can bear testimony of the correctness of Mr. Yearsley's statement of the improvement of the voice which occurs immediately after the excision of the enlarged tonsils of those who are

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[49]"Stammering, Its Cause and Treatment," *Lancet*, II (March 27, 1841), p. 23.

[50]*Western Journal of Medicine and Surgery*, (Louisville, Ky), IV (August, 1841), p. 127.

[51]*Lancet*, II (July 17, 1841), p. 589.

not stammerers, but articulate badly from enlargement of these organs.[52]

The professional publications were quick to launch a series of condemnations of the operations against both English and French surgeons.

> Within the last few months, a perfect mania for operating seems to have seized the profession, every member of which appears to be desirous of becoming a Cooper or a Dieffenbach: not content with bringing some hundreds of squinting eyes straight (a few being put out and destroyed in the attempt), we have not operators who straighten the crooked back by cutting out a portion of its motor muscles, who remove false anchylosis of the knee by dividing the hamstring tendeons, and who set a crooked head straight on the shoulders by cutting across the sterno-cleido-mastoideus. . . . The last grand series of the bold and violent operations serve as the climax. Dieffenbach, Amussat and others have brought forth operations for the cure of stammering. . . . Amussat's operation consists of the division of the genio-hyo-glossus muscle. . . . Dieffenbach's is one of the most horrible that can be imagined. . . . The frightful attendant hemorrhage, the great risk of losing the tongue, or life itself, has little to recommend it. . . . The remaining operation, removal of the tonsils, and uvula has little to recommend it. It is hoped the British Medical Profession will not follow in the footsteps of the few foolhardy British and foreign surgeons who have brutally and without knowledge attempted to correct surgically man's speech.[53]

On every hand the storm was raging. Some British physicians and surgeons opposed not only Yearsley's operation, but all similar ones. Others appeared to be undecided.

> Dr. Bishop, in a meeting of the Medical Society of London on March 22, 1841, discussed the cure for stammering without the need for an operation. He pointed out that stammering could not result from tension of the frenum otherwise the child could not nurse naturally, nor pronounce d, t, n; nor could it be tongue muscles, for the stammerer could not even articulate at intervals. He discounted the effect of the velum and tonsils on speech.[54]

In the same meeting, Mr. Dowing believed

> that three kinds of operations had been recommended and performed for the cure of stammering; the one proposed by Mr. Yearsley, that discovered by Dieffenbach, and that practiced by Mr. Bennett Lucas; though the latter gentleman's case bore

[52] *London Medical Gazette*, XXVIII (1841), p. 118.
[53] *Loc. Cit.*, p. 24.
[54] *Lancet*, II (1840–41), p. 25.

no comparison in number to Mr. Yearsley's, as he had hitherto operated upon only 14 persons. In all these cases as well as in those he had seen operated upon by Mr. Yearsley, the operation at the time certainly appeared successful; but he contended that we had not yet sufficient time to determine whether the good effect would be permanent. Looking at the invariable success of all the operations, which were so remarkably different in kind, who could not help but think that much of the effect was dependent upon the shock to the nervous system and the loss of blood consequent upon it. Mr. Lucas's operation consisted of the division of the frenum and the removal of a portion of the anterior fibers of the genio-hyo-glossi muscles; Mr. Lucas did not perform his operation upon all who applied, as Mr. Yearsley appeared to do, but always thoroughly examined each case into its history and causes. (P. 23).

. . . . . .

That it [stammering] could be at all connected with the more or less open state of the air passages, Dr. Hall regards as most improbable. In many cases there was no enlargement of the uvula or tonsils or tongue, neither was there any want of volume of force of expired air when the word was pronounced or in the pronunciation of such letters as did not absolutely interrupt the flow of expired air, as v, s, etc.; nor was there . . . any obstruction to the flow of air in the larynx itself, as he (Dr. Hall) had shown in a paper published in the *Journal of the Royal Institution* in 1831. . . . Elongation of the uvula could have no effect in inducing stammering as supposed by falling on the tongue. (P. 25).

. . . . . .

Mr. Malyn . . . thought . . . that the good effect was dependent upon the removal of the uvula . . . further proved by all persons operated upon remarking that a great weight was removed from the scrobiculus cordis, a weight which would arise from the obstruction to the expiration of the air; the tonsils could not produce such an obstruction, nor could he see how their removal acted beneficially. He was also at a loss to understand in what manner the removal of a portion of the genio-glossi muscles could be of benefit. . . . The operation would not succeed in all cases as stammering depended on a number of causes; and even where it was of benefit, education must go hand in hand with its performance. (P. 24).[55]

Discussion, however, in the pages of *Lancet* was not limited to the medical profession. John von Horn, D. D., of the University of Göttigen, Hanover, Germany, wrote the following:

In the daily papers last week and this, various paragraphs occurred on the surgical cure of stammering of operations made

[55] *Ibid.*

on boys, and lectures delivered on this subject. The discovery, however, of this method of curing stammering is quite new and can hardly be supposed that a sound knowledge of it should have reached already this country [England], whose medical gentlemen are, generally, not acquainted with German. The discovery was only, in the beginning of last winter, made by Professor Dieffenbach of the University of Berlin. . . . In January last, the Hamburg correspondent mentioned the recent discovery and in the same month I received a letter from a friend of mine in Berlin containing the following notice: "Our Professor Dieffenbach made another useful discovery, viz., to cure stammering and stuttering by dividing certain muscles of the tongue. He makes no secret of it but read a paper on his method at the Society of Physicians of Berlin and operated himself in the presence of a number of medical gentlemen on a stammering lad . . . "

On hearsay information, no surgeon should undertake the operation on so delicate a part of the human body. . . . It is not enough to know the names of the muscles and parts to be divided, but much depends on the place and deepness of the incision. An unskillful operation may bring on inflammation and death or cure but imperfectly stammering. . . . Surgeons should procure one of the various publications already published in Germany on Dieffenbach's system of curing stammering. . . . I should myself be ready to assist respectable surgeons in getting sound knowledge of this system.[56]

Yearsley, by now smarting under the criticism heaped upon him, as a last resort submitted an advertisement to the *Lancet* to be placed on its cover. The Editor, confronted with this wrote:

Mr. Yearsley has forwarded to our publisher an advertisement for insertion on the cover of the *Lancet*, having reference to remarks which have appeared in this Journal upon his progress and proceedings in a popular line of business. We desire to take no advantage whatever to Mr. Yearsley which is not based upon facts, and we stand on this question quite as much as before the tribunal of the public for judgment as does Mr. Yearsley himself. With a disposition to do all possible justice to that gentleman, we voluntarily copy into this place the advertisement on the wrapper to which we refer in order that the comment of its author, and the statement of his critics, may always be found in the same volume:

"*To the Readers of the Lancet*"

"Can I be expected to continue a controversy with the whole herd of stammering schoolmasters and the Editor of the *Lancet* into the bargain? The odds are too great; neither is the field a fair one, as may be seen by referring to "Notices of

[56] *Ibid.*, p. 15.

> Correspondents" of the last three or four weeks. Therefore, I "bide my time," when, I trust, I shall prove I have neither unnecessarily maimed my patients, misrepresented facts, or deluded myself. For the present I must content myself with affirming that I have cured many cases of stammering by surgical means alone, and shall continue to do so when it be associated with disorganization of the throat."
>
> James Yearsley,
> 21 Sackville Street.
> July 20, 1841."[57]

The heydey of Yearsley had been reached, his efforts had gone unrewarded by his colleagues as a whole. For the next few years he *did* "bide his time," until November 9, 1843, when he wrote:

> Three years have elapsed since my attention became accidentally drawn to the subject of stammering. . . . I have been much misunderstood, misrepresented and maligned, all of which I have patiently submitted to. . . . I shall still be found an advocate of surgical treatment, but with my views much modified, and it is on this latter account that I now solicit a place in your columns.[58]

But the zenith of the surgical cure had been passed. Yearsley and his "cure" were long since forgotten by the medical profession as a whole. Such operations were by now nothing but history.

During Yearsley's "successes," James Braid, a prominent physician and mesmerist, was advocating his particular cure. He, too, laid claim to the title as "England's First Operator for Stammering."

> It appears that Mr. Yearsley's first operation was in December last, 1840, and that of Dieffenbach on the 7th of January, 1841, while my first operation for stuttering was performed on September last. As noted in my letter of the 8th instant, it is a curious circumstance that we should have been prosecuting the same subject about the same time, and with similar view, without the knowledge of what each other was doing.[59]

Braid, however, did not attain the eminence of Yearsley. Neither did he arouse such vituperations. Yearsley, operating in London, was close at hand for the critical scrutiny of powerful London medical societies. Braid, on the other hand, practiced in Manchester and was left relatively alone by the societies. Nevertheless, he received his share of criticisms. Braid in no way acknowledged the superiority or equal of Yearsley's operation.

> Mr. Yearsley's notions as to the cause of stammering and mode of cure are very nearly the same as my own; but not

[57] *Ibid.*, p. 638.

[58] *Lancet*, I (1843-44), p. 244.

[59] *London Medical Gazette*, XVIII (1841), p. 116.

> entirely so. . . . Stuttering is caused by the glottis being prevented from rising sufficiently to admit the quantity of air required, and acting with that promptitude necessary to secure free and correct enunciation. Mr. Yearsley, on the contrary, conceives that *no* air is allowed to escape from the chest and that there is besides an impossibility of any passing forward into the mouth, from an absolute closure of the anterior fauces by approximation of the dorsum of the tongue and palate.[60]

In some respects though, Braid's views on the matter were similar to Yearsley's. He thought that stammering arose chiefly from "want of proper action in the epiglottis and the effect resulting therefrom on the vocal cords."[61]

> Both Dieffenbach's, Mr. Yearsley's and my own mode of operating tend to secure the same freedom of opening of the glottis; the former drawing the root of the tongue, and of course the epiglottis, upwards and forwards; the latter by removing the obstacle to its free opening in allowing it to rise by removal of the enlarged tonsils, and its advancing forward by removing the brindling of the tongue by division of the frenum, or preventing the titillation of the enlarged uvula, stimulating that ever watchful sentinel, the epiglottis, to too vigorous exercise of its functions of guarding the entrance of the glottis from all impertinent intruders.[62]

Little is known about Braid's actual operative technique other than

> . . . for the division of the frenum I use a pair of sharp-pointed knife-edged scissors; and although I have to cut so freely as completely to expose the blood-vessels in that situation, I have never had more than a teaspoonful or two of blood from any single operation.[63]

Differing from Braid's view was the theory of Bennett Lucas, a London physician-surgeon operating at the same time.

> The operation on the genio-glossi as performed by Mr. Lucas does not materially differ from other methods . . . except that a portion of the muscle is removed, but is a different mode of dividing these muscles . . . as has been practiced to some extent by M. Bonnet of Lyons.[64]

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[60] *Ibid.*, p. 117.

[61] *Retrospect of Practical Medicine and Surgery*, III (Jan.-July, 1841), p. 78.

[62] *London Medical Gazette*, XXVIII (April 9, 1841), p. 117.

[63] *Ibid.*

[64] *Western Journal of Medicine and Surgery* (Louisville, Ky.), IV (July 1, 1841), p. 133.

This would be a very dangerous operation. The medical journals were quick to see this.

> Mr. Bennett Lucas has just performed this operation, dangerous as it is, at the Metropolitan Free Hospital . . . as related in the Provincial Medical and Surgical Journal for May 8 [1841] . . . We cannot, however, avoid raising our voice, feeble as it is, against such a proceeding. . . . The first intimation which Mr. Lucas has of the cure of stuttering was from a newspaper in which Dieffenbach's operation was alluded to. . . . His [Lucas'] operation has for its object the division and partly removal of those muscles which oppose the free elevation of the tip of the tongue to the superior alveolar arches. . . . He thinks, also, that far too much weight is attached to those who consider the affection of the glottis by which an arrest of the passage of air necessary to pronunciation takes place."[65]

Operating about the same time as Lucas and Braid was August Franz. On March 9, 1841, he writes:

> On the 22nd of last month I received from my friend, Professor Dieffenbach, his memoir on this subject, as addressed to the Institute of France and dated the 31st of January, 1841. From the information obtained from this source I was enabled to perform this new operation according to the rules laid down by him. . . . I performed on the first of March my first operation on George Reed, 17 years of age.[66]

It is thought that Franz did not operate on more than six or eight cases at the most, forsaking the operation entirely as "making a bad case worse." In all these operations, he followed Dieffenbach's third operation—the excision of a wedge from the root of the tongue.[67]

Alexander J. Lizars, in a letter dated August 14, 1841, reported his operation:

> P. M., aged 35, had stammered from his infancy. The difficulty was evidently caused by the spasmodic contractions of the muscles of the tongue and neck. The tongue upon examination was found to be shorter than natural. I operated in presence of my assistants . . . and two of my pupils.
>
> The instruments employed were a straight, sharp pointed bisoutry; a curved-pointed, bisoutry, with the cutting edge about an inch long, the remainder of the blade being blunt; a four-headed sling, or roller; and a compress of lint.
>
> The patient having been placed in the sitting position, with the sharp pointed bisoutry I made a puncture, rather less than a quarter of an inch in length, through the integuments of the

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[65] *Retrospect of Practical Medicine and Surgery*, III (Jan.-July, 1841), p. 76–77.

[66] *London Medical Gazette*, 1840–41, pp. 921–22.

[67] *Western Journal of Medicine and Surgery*, (Louisville, Ky.), IV (July 1, 1841), p. 133.

> lower part of the chin, about an inch posterior to the symphysis. I then pushed the curved bisoutry gently upwards and a little forwards until I saw its probe elevating the mucous membrane of the floor of the mouth; placing my forefinger of my left hand upon the probe point and the mucous membrane, I turned the cutting edge of the instrument to the right and divided the muscle of that side, the bisoutry was then carefully brought back to the mesial line and the other half having been divided in a similar manner, the instrument was withdrawn and the four-headed sling applied after the compress much in the same way as is done for a fracture of the lower jaw.[68]

It is not known whether Lizars operated extensively. From the nature of the report, it is assumed this was his first operation and perhaps his last, since the operation rapidly was losing favor.

The *Dublin Medical Press* in summarizing the various operations, lists twelve different types in eight divisions:

> 1. Simple traverse division of the muscular structure of the base of the tongue, performed by Dieffenbach by two separate methods.
> 2. Traverse division, with excision of a portion of the base of the tongue, performed by the same surgeon.
> 3. Lucas's method, consisting of excision of a triangular portion of the bodies of the genio-glossi muscles.
> 4. A simple incision in the bodies of the genio-glossi muscles, common to Amussat, Phillips, and Velpeau, though performed in a different manner by each.
> 5. Division of the attachment of the tendons of the genio-glossi muscles (and occasionally of the hyo-glossi muscles also) to the lower jaw, performed in different ways by Baudens and Bonnet.
> 6. Simple division of the mucous membrane, and subjacent tissue of the floor of the mouth, occasionally found sufficient by Amussat.
> 7. Excision of a portion of the apex of the tongue, performed in one case by Velpeau.
> 8. Mr. Yearsley's method of snipping off a portion of the uvula.[69]

On May 8th, 1841, *Lancet* reports the most amazing of all the surgical "cures" for stammering:

> It consisted of the removal of the extremity of the coccynx by means of a half-dozen elegant little instruments invented for the express purpose, and the insertion of a needle with a large eye at the extremity into the cancellated structure of the bone. The needle is so constructed as to admit of being attached to the

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[68] *Lancet*, II, (August 21, 1841), p. 766.
[69] *Dublin Medical Press*, April 14, 1841, p. 234.

> conducting wire of a pocket galvanic battery, of about the size and similar to an ordinary hunting-watch. When the patient wishes to speak, he attaches the wire to the end of the needle, and immediately the galvanic current being transmitted by the vertebral column issues through the fauces and keeps the velum palati distended like a sail, and uvula floating upon its stream like a pennant, while the voice is perfectly regulated. The eminent members of the profession who were present at the first operation performed on this principle, were completely electrified at its wonderful success. It is proposed to petition Parliament for a patent for this truly philanthropic discovery.[70]

Approximately one year later on April 2, 1842, another amazing "cure" was reported, this one to aid in "preventing the return of stammering."

> M. Malagodi commences by comparing the cause of this affection with that of clubfoot, wry neck, strabismus, etc., and shows that in stammering as in other diseases, the section of the retracted muscles is the essential point of the treatment. But in all these cases, section alone cannot produce a cure; it is necessary to keep the two ends of the divided muscle separated for a sufficient time by some mechanical means to prevent a return of the affection.
>
> Acknowledging the correctness of these data, the remedial measure which he proposes appears simple enough. It consists in keeping, for some time after the operation, the divided surfaces of the genio-glossi muscles as widely separated as possible. For this purpose, we may select one among the various instruments invented for the cure of stammering and which mostly act by keeping the tongue retracted within the mouth. These instruments act in the same manner as those employed for clubfoot, are of but little value when employed alone; but in maintaining the effect produced by the division of the muscles, a new field is opened for their utility. The one which M. Malagodi usually gives preference is a small forked-like instrument, invented by Itard, and which, being about an inch in length, is applied by one of its extremities against the lower jaw, while the frenum linguae of the tongue is received within a small befurcation at the opposite end and the tongue is thus forced backward.[71]

In America, however, some surgeons were beginning to use varieties of the operation. Its existence was short and never enthusiastically received as in Europe. Dr. Alfred C. Post of New York City apparently was the first American to perform an operation on

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[70] *Lancet*, II (1840–41), p. 240.

[71] Malagodi, M., "On the Cause of the Frequent Return of Stammering After Division of the Genio-Glossi Muscles and a New Method of Preventing It," *Italian Medical Journal*, as quoted in *The Medical Times*, VI (April 2, 1842), p. 14.

May 21st, 1841, when he divided the genio-glossi muscles on a young man.[72] Post reports the operation as follows:

> I have performed the operation a single time, and I am not aware that it has been performed by any other surgeon in this country. . . . On May 21st, 1841, I performed the operation for stammering according to the method pursued by Baudens of Paris. The mouth being open widely, I plunged the points of a strong pair of scissors on each side the frenum linguae and as closely as possible to the lower jaw to the depth of nearly an inch from the floor of the buccal cavity, embracing the origin of the genio-hyo-glossi muscles between the blades of the scissors, by closing which the muscles were divided. I then introduced my forefinger into the wound and feeling one or two fibers which had not been cut by the scissors, I completed the division with a narrow bisoutry.[73]

On the 30th of the following month there appeared a report of another operation, another "first!"

> A novel operation was performed by Dr. Schmidt of Warren Street, New York, early last week. It consisted of dividing the genio-hyo-glossi of a stammerer. No one has ever before given surgical aid of this kind in America, and it remains to be proved whether any good will result from it.[74]

American Medical journals were never as critical of this operation as were those of England. This is probably due to the lack of enthusiasm for this operation by members of the profession. By the time the actual operations were performed in America, news had filtered in through foreign medical publications of the lack of success in such surgical methods. Then, too, America lacked the compactness racially and professionally, which undoubtedly retarded rapid dissemination of information.

By September, 1841, there were few such operations being performed anywhere in the States. However, one physician received late recognition for his work.

> Much attention has been directed to this subject in the last few months, and we are glad to see by a slip from a newspaper which was handed to us a few days since, that Dr. Toland of Columbia, S. C., has recently operated successfully. "The patient," says the editor, "is a boy about 7 or 8 years of age; and when we saw and talked with him on Monday last, only 3 days after the operation, he was completely cured—every vestige of the impediment to his speech being entirely removed." The operation was "simple and very little soreness was felt three days later;" but the account does not state, and we have not

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[72] *New York Medical and Surgical Reporter*, I (1845–6), p. 70.
[73] Post, Alfred C., *Op. Cit.*, pp. 62–3.
[74] *Boston Medical and Surgical Journal*, XXIV (June 30, 1841), p. 351.

> heard through any source, what one of the various operations recommended was employed. Dr. T. is a graduate of Transylvania about 12 years hence, and is a man of high respectability.[75]

As late as 1845, however, there was still some comment about the operation. Dr. Mott, one of the leading surgeons of the day, said in a clinic at New York on November 15:

> I happened to be at Paris at the time the operation was performed . . . and quite a controversy took place between Roux and Velpeau respecting which had done it first, having both performed on the same day—one in the morning, the other in the middle of the day . . . but I am unable to say who first performed the operation. Since my return, I have performed the operation between 2 and 300 times, and I am not prepared to say that 5 out of that number have been in the least benefited.[76]

Thus closes one of the most interesting phases of man's continuous efforts to find a cure for stammering. Fortunately, the end of 1841 saw also the end of what there had been of triumph in the attempted surgical treatment, though such operations continued to be carried out here and there.

One is prompted to ask: To what were the "cures" based upon surgery due? A decrease of stammering undoubtedly did take place in some cases. A counter question might be raised: Could not some improvement be shown by *any* operation for other purposes? As Appelt has noted,[77] some stammerers show improvement in their speech regardless of the type of operation. The "progress" reported by over-zealous surgeons two or three days following the operation could possibly be attributed to the relaxation of the convalescent stage, the exhaustion of the operation and total relaxation following it seemingly evidenced a "cure." The factor, too, of auto-suggestion may have contributed to improvement. The stammerer, buoyed up by the hope of relief at the surgeon's skillful hands, experienced a momentary relief, which relief was not due to the operation itself, but rather to the patient's own self-suggestion.

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[75] *Western Journal of Medicine and Surgery*, IV (Sept., 1841), p. 236.
[76] *New York Medical and Surgical Reporter*, I, (1845-46), p. 70.
[77] Appelt, Alfred, *Op. Cit.*, p. 31.

NEWS AND NOTES—(*Continued from page 42*)

Medical School of the University of Königsberg was one of the finest in Germany. There was where the famous Helmholtz initiated his first outstanding laboratory; and he was followed therein, by the equally famous Hermann; who in turn was followed by the likewise internationally known Weiss. With both of the latter Dr. Sokolowsky was closely associated. His publications have had such outstanding merit that the Journal of Speech Disorders is glad to invite his contributions. Your editor who is responsible for inviting him over also immediately bespoke his aid on the forthcoming Dictionary of Speech Disorder Terms on the group dealing with Voice Impairments. He has already rendered us signal service in that capacity.

SPEECH WITHOUT A TONGUE[1]

MAX A. GOLDSTEIN, M. D.
Director of Central Institute,
St. Louis, Mo.

In man, the development of articulate speech has necessitated evolutionary changes in tongue musculature, shape in all parts of the oral cavity, development of resonators and laryngeal details. It is quite evident from these numerous changes that the complicated processes of articulate speech are not dependent on the functions of the tongue alone.

We have thought and taught empirically for over a century that the tongue is absolutely essential in the production of various consonant elements. For example, to produce the consonant *t* or *d* the tip of the tongue must touch the upper incisor teeth; for *k* and *g* the middle third of the tongue is arched upward to approximate the curved shape of the hard palate; for *L* the nose is blocked off, the tip of the tongue is placed behind the upper incisor teeth and pressed against the palate, the tongue thus dividing the voice output into two parts. All other consonant elements have been given their empirical allotment in tongue positions.

The question now under discussion is: "Can these consonant elements be produced without the aid of the tongue and how is this mechanism made possible?"

The circumstances which actually induced this investigation are to be found in three cases of total amputation of the tongue, this radical surgery being necessitated by cancer of this organ.

Briefly, these cases may be described seriatim as follows:

Case I.—C. C. M. F., male, age 59 years, was seen in July, 1931, with a very bad carcinoma on the left side of the tongue. A thorough left-sided neck dissection and complete removal of the tongue extending down to the cornu of the hyoid bone, was done by Dr. James Barrett Brown. The neck wound was left open and he was fed with a feeding tube for several weeks. He made an almost

[1]Abstract of Research Thesis published in "The Laryngoscope," February, 1940.

uneventful recovery, and the oral fistula from the mouth to the neck was closed some weeks later.

Since then, the patient has made a remarkable rehabilitation of his life, able to carry on his work as a plumber, easily understood by anyone and completely understood over the telephone. He states that he has the same sense of taste that he always had and requires the same seasoning in his food. He has been issued three insurance policies and at this date, October 12, 1939, he is apparently in perfect health with no evidence of any local or distant lesions.

Case II.—W. S., male, age 64, was operated on January 15, 1937. His surgeon, Dr. E. Lawrence Keyes reports as follows:

"Patient had sores on his tongue for about a year and a growth on his tongue for three months, quite painful when he chewed. Examination showed a large lesion over the anterior third of the dorsum of the tongue, measuring from 1.7x1.5 cm., involving chiefly the mid-portion and extending somewhat to the right. The margins were raised and pearly, and the growth was papillary in character. There was a second similar area on the right margin of the tongue somewhat smaller. On April 10, 1937, his tongue was amputated at the Jewish Hospital. All of the right half of the tongue and the anterior and middle thirds of the left half were removed purposely leaving a portion of the posterior third of the left side. The patient made an uneventful convalescence and since that time has shown no evidence of recurrence."

On February 18, 1939, Dr. Keyes demonstrated W. S.' ability to speak with such a small residuum of tongue tissue, before the meeting of the National Forum on Deafness and Speech Pathology, in St. Louis. He was readily understood in the back of the room. His only defective speech elements were voiced and unvoiced "th."

Case III.—W. M., male, age about 71 years, operated for diffuse cancer of the tongue about thirty years ago by Dr. E. L. Bernays. The anterior tongue was radically removed, all muscle and glandular tissue being carefully dissected away. This pateint made an uneventful recovery, has continued at his profession actively and is in good vigorous physical condition for a man of his age. His speech is understandable, fluent and seemingly produced without effort. This speech accomplishment is entirely the result of the patient's own efforts, and no speech coaching has been given at any time.

It is a singular fact that these three cases as well as others that have been discussed with surgical colleagues, have all been able, after their convalescence, to produce oral speech that is understandable and quite distinct as to its articulation nicety. In almost every case such speech was self taught and was accomplished without the assistance of specially trained teachers. These cases, then, present a challenge to those concerned with speech production, phonetics and articulation. If the tongue is so indispensable to speech and its production, how can these subjects substitute the necessary accessories in the complicated mechanism of this function?

As a final feature of this investigation, I present an accurately produced phonograph recording of the speech of the first of these recorded tongueless men.

EDITOR'S NOTE: The phonograph record was played, and to the amazement of every individual in that packed auditorium, these tongueless men spoke fluently and clearly. Indeed, the consensus of opinion seemed to be that nobody could have guessed they were tongueless. All sounds, including both consonants and vowels, were well enunciated, and apparently no one of them would have been confused with another. No individual among the several hundred present voiced his objection to the apparently universal conviction that the demonstration proved conclusively that the tongue could no longer be considered absolutely necessary in the production of any speech sound.

G. OSCAR RUSSELL.

TEXT OF PHONOGRAPH RECORD

For over a century the tongue has been considered as the most indispensable organ in the production of human speech and its changing position in the oral cavity for the enunciation of consonant elements has been classically considered and taught in all literature of speech and phonetics.

In the light of modern acoustic principles and mechanics of speech it is possible that much of this information concerning the physiological functions of the tongue may have been developed with too much empiricism.

A most effective example to illustrate our exaggeration of the importance of tongue positions in the production of consonant elements of speech is offered in the phonograph record now presented of a case of total amputation of the tongue.

The patient, Clarence C. M. Finn, fifty-seven years of age, a plumber by trade and a resident of St. Louis County, was operated in July, 1931, by Dr. James Barrett Brown, of St. Louis. The operation was imperative and consisted of complete extirpation of the tongue for cancer. The tongue was amputated flush with the cornu of the hyoid bone and not a vestige of tongue tissue remains.

This patient made an uneventful recovery, has had no recurrence of this pathology in over seven years, and his rehabilitated speech is self-taught and was acquired within a few weeks after the healing of the operated field.

Before commenting further on this unusual speech rehabilitation I will ask Mr. Finn a few questions to indicate his facility in daily conversation.

Q. What is your name?

A. Clarence Cornelius Michael Finn.

Q. Where do you live?

A. I live at 201 East Etta Avenue, St. Louis County.

Q. How old are you?

A. I am fifty-seven years of age.

Q. What is your occupation?

A. I am a plumber.

Q. How long have you been engaged in this work?

A. For forty years.

Q. Have you found the absence of your tongue a special handicap in carrying on your trade?

A. I have no trouble in getting those with whom I come in contact to understand everything I say.

Q. Did you receive any medical treatment for this pathology of the tongue before you consulted your surgeon?

A. I was treated by a doctor with a so-called "cancer paste" for six weeks and the pain was something terrible.

Q. How soon after the amputation of your tongue did you find it possible to make yourself understood by speech?

A. Almost immediately.

Q. Do you use the telephone in your business?

A. Certainly, just like everyone else uses it.

Q. Do people have any difficulty understanding you over the telephone?

A. None whatever.

Now, Mr. Finn, I should like you to illustrate with your own voice and speech what facility and accuracy you have in fluent speech. For this purpose we have arranged a series of sentences in which initial consonants are used that have always been considered impossible without the tongue assuming certain positions in the mouth cavity. These consonant elements are offered to convince the listener of the ease, quality and distinctness of your speech.

Please read the sentences that have been prepared to illustrate the individual consonant elements. The first consonant I will ask you to illustrate is "T."

First is the letter.....*T*.

*T*he *t*wo *t*all *t*ravelers *t*old the *t*ale *t*o *T*homas.
*T*en and *t*en and *t*wo are *t*wenty-*t*wo.

Next.....*L*.

*L*ongfe*ll*ow *l*oved *l*ittle chi*ld*ren.
*L*uke *l*ost his *l*uggage in the *l*ake.

Then.....*K*.

The *c*ook *c*ut the *c*oco*a*nut *c*ake into *q*uarters.
The *c*at *c*limbed the tree and *c*aught the *c*anary.

Now.....*N*. and *M*.

*N*inety-*n*ine *n*ame*s* were *n*ailed to the sig*n*.
*N*o one *kn*ew the *n*ame*s* of the *n*ine *n*ew *n*avy cruisers.

Next.....*D*.

*D*an and *D*avid went on a *d*aring a*d*venture.
*D*on't *d*eny yourself the *d*elight of your *d*aily *d*ozen.

Then.....*G*.

Are you giving grandmother a Christmas gift?

Finally a sentence that contains *all* of the above consonant elements:

Good gracious! Did I *take* the *candy* from *little Nellie*?

This demonstration offers practical evidence of ability to produce understandable speech involving the speech elements which heretofore were thought impossible without the aid of certain positions of the tongue in the mouth cavity.

For *T* we have always taught that the tip of the tongue must touch the posterior surface of the upper incisor teeth.

For *K* the middle third of the tongue is arched so that it approximates the arch of the palate above.

For *L* the tip of the tongue is raised and the anterior third of the tongue partly depressed in the floor of the mouth.

For *D* a similar position to that used for *T* is assumed.

N and *M* have similar positions but include a different placement of the vocal element as the directed sound reaches the nasal resonating cavities.

Added to this tremendous handicap this patient has but three remaining teeth and much of the alveolar process of the jaw has been absorbed as is frequently found in the aged.

Another interesting observation in this case is Mr. Finn's own report about his sense of taste. Tell us about this, Mr. Finn. "Well, there are a good many things to eat that we all like to eat and if I didn't have a sense of taste almost everything would be alright, but I like a lot of different good things to eat and I am always well satisfied."

Finally, the lower branches of the facial nerve supplying the left upper and lower lips were cut during the operation; yet with the absence of these three important factors in the production of speech, this gentleman has given an excellent account of himself in the quality, distinctness, inflection and volume of spoken language.

Here is a real problem for research and perhaps reconstruction of our knowledge of speech physiology as it concerns the tongue.

In the teaching of speech, especially to the deaf child, and in the correction of defects in speech, less attention should be given to empirically prescribed positions of the tongue than to the modification of shape and size of these accessories of the oral cavity and to breathing exercises and breath control.

In the finesse of production of the singing voice, breath control and voice placement have long been recognized as of major value, and the same philosophy and practice are logical conclusions where the speaking voice is concerned.

The analysis which I have endeavored to present in this thesis offers, I think, sufficient evidence: (1) that the tongue is not absolutely indispensable as an organ of articulate speech; (2) that various other parts of the mouth cavity may be utilized to replace it; (3) that understandable, fluent speech can be produced without a tongue; (4) that our knowledge of the physiology of the tongue as an organ of speech is subject to much needed revision.

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American Speech Correction Association

The American Speech Correction Association was organized in New York City in December, 1925, at the annual convention of the National Association of Teachers of Speech with which this organization has always been affiliated. Its original name, the American Academy of Speech Correction, was changed to the American Society for the Study of Disorders of Speech in 1927, and the present name was acquired in December, 1934.

The purposes of the American Speech Correction Association as set forth in its Constitution are:

1. To stimulate among educators, physicians, and others of the general public a deeper, more intelligent interest in problems of speech correction.
2. To raise as rapidly as possible existing standards of practice among workers in the field of speech correction.
3. To secure public recognition of the practice of speech correction as an organized *profession.*
4. To furnish this new profession with responsible and authoritative leadership.
5. To make this leadership generally respected by our good works, i. e., by our scholarly research work, publicity work, and administrative skill.
6. To make membership in our organization a coveted recognition of merit and in this way to furnish workers in the field of speech correction with a powerful incentive to greater achievements.

The Association is composed of Associates and Fellows. Any reputable speech correctionist with a college education or its equivalent is eligible for election as an Associate.

A Fellow is usually a pioneer or leader in the field of speech correction who has done eminent research work in speech correction and obtained the doctor's degree.

American Speech Correction Association

Membership List
1940

1940 LIST OF MEMBERS

The following alphabetical list of members of the Association gives the title, degree, professional rank, and address of every Fellow and Associate whose 1940 membership dues were paid on February 1, 1940, in accordance with Section 4 of Article III of the Constitution as amended at the 1938 Cleveland Convention. This is not a complete list of members.

NOTE.—In the following list the names of the Associates are indicated by (A) and the names of Fellows are indicated by (F).

Most of the abbreviations used are standard and self-explanatory. The less obvious ones are as follows: correction—cor., improvement—imp., teacher—T.

Teachers teach in the city where their address is listed unless otherwise noted.

In listing institutions which have granted degrees, all state universities have been designated simply by the abbreviation of the state.

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